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SAR TEST REPORT

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue:** 04. 10, 2019 **Test Report No:** HCT-SR-1904-FC001 **Test Site: HCT CO., LTD.**

FCC ID: A3LSMA6060

Equipment Type:	**Mobile Phone**
Application Type	**Class II Permissive change**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**SM-A6060**
Additional Model	**SM-A606Y/DS**
Date of Test:	**04/08/2019 ~ 04/10/2019**

The test data shown in this report were evaluated in the worst case under each SAR test condition of the original compliance assessment SAR report: (Report No: HCT-SR-1903-FC002-R1)

This device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By	Reviewed By
In-ho, Park Test Engineer SAR Team Certification Division	Yun-jeang, Heo Technical Manager SAR Team Certification Division

DOCUMENT HISTORY

Rev.	DATE	DESCRIPTION
HCT-SR-1904-FC001	04. 10, 2019	First Approval Report

Table of Contents

1. ATTESTATION OF TEST RESULT OF DEVICE UNDER TEST

Test Laboratory	
Company Name:	HCT Co., LTD
Address:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea
Telephone:	+82 31 645 6300
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Attestation of SAR test result	
Applicant Name:	SAMSUNG Electronics Co., Ltd.
FCC ID:	A3LSMA6060
Model:	SM-A6060
Additional Model	SM-A606Y/DS
EUT Type:	Mobile Phone
Application Type:	Class II Permissive change

The Highest Reported SAR

Band	Tx. Frequency	Equipment Class	SAR (W/kg)			
			1g Head	1g Body-Worn	1g Hotspot	10g Extremity
	(MHz)		(W/Kg)	(W/Kg)	(W/Kg)	(W/kg)
GSM/GPRS/EDGE 850	824.2 ~ 848.8	PCE	<0.10	<0.10	0.41	N/A
GSM/GPRS/EDGE 1900	1 850.2 ~ 1 909.8	PCE	0.10	<0.10	0.24	N/A
UMTS 850	826.4 ~ 846.6	PCE	<0.10	0.11	0.19	N/A
UMTS 1900	1 852.4 ~ 1 907.6	PCE	<0.10	<0.10	0.18	N/A
LTE Band 5 (Cell)	824.7 ~ 848.3	PCE	<0.10	0.17	0.35	N/A
LTE TDD Band 41	2 555 ~ 2 655	PCE	0.18	<0.10	<0.10	N/A
802.11b	2 412 ~ 2 462	DTS	0.52	0.14	0.37	N/A
U-NII-1	5 180 ~ 5 240	NII	N/A	N/A	N/A	N/A
U-NII-2A	5 260 ~ 5 320	NII	<0.10	<0.10	N/A	N/A
U-NII-2C	5 500 ~ 5 720	NII	<0.10	<0.10	N/A	N/A
U-NII-3	5 745 ~ 5 825	NII	<0.10	<0.10	<0.10	N/A
Bluetooth	2 402 ~ 2 480	DSS	<0.10	<0.10	<0.10	N/A
Simultaneous SAR per KDB 690783 D01v01r03			0.70	0.31	0.78	N/A
Date(s) of Tests:	04/08/2019 ~ 04/10/2019					

The test data shown in this report was evaluated in the worst case under each SAR test condition of the original compliance assessment SAR report: (Report No: HCT-SR-1903-FC002-R1)

Since the Permissive changes of this device is only the change of the some Parts of the DUT that does not affect the RF exposure, the evaluation for this report were carried out under the condition of the worst case of the wireless band modes of the original compliance evaluation : (Report No: HCT-SR-1903-FC002-R1)

2. DEVICE UNDER TEST DESCRIPTION

2.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
GSM 850	Voice / Data	824.2 ~ 848.8 MHz
GSM 1900	Voice / Data	1 850.2 ~ 1 909.8 MHz
UMTS 850	Voice / Data	826.4 ~ 846.6 MHz
UMTS 1900	Voice / Data	1 852.4 ~ 1 907.6 MHz
LTE Band 5 (Cell)	Voice / Data	824.7 ~ 848.3 MHz
LTE TDD Band 41	Voice / Data	2 555 ~ 2 655 MHz
2.4GHz WLAN	Data	2 412 ~ 2 462 MHz
U-NII-1	Data	5 180 ~ 5 240 MHz
U-NII-2A	Data	5 260 ~ 5 320 MHz
U-NII-2C	Data	5 500 ~ 5 720 MHz
U-NII-3	Data	5 745 ~ 5 825 MHz
Bluetooth v5.0	Data	2 402 ~ 2 480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2 402 ~ 2 480 MHz

<table>
<tr><th colspan="3">Device Description</th></tr>
<tr><td>Device Dimension</td><td colspan="2">Overall (Length x Width): 155.2 mm x 73.9 mm
Overall Diagonal: 165.0 mm
Display Diagonal: 162.1 mm</td></tr>
<tr><td rowspan="2">Battery Options:</td><td colspan="2">Standard (Li-ion Polymer Battery)</td></tr>
<tr><td colspan="2">Battery Model Name: EB-BA606ABU (ATL)</td></tr>
<tr><td rowspan="5">Device Serial Numbers</td><td>Mode</td><td>Serial Number</td></tr>
<tr><td>GSM1900, UMTS 1900, GSM850, UMTS 850, LTE Band 5</td><td rowspan="2">QK36386U</td></tr>
<tr><td>LTE TDD Band 41</td></tr>
<tr><td>2.4 GHz WLAN, 5 GHz WLAN, Bluetooth</td><td>QG62153U</td></tr>
<tr><td colspan="2">The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.</td></tr>
</table>

2.2 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. All hotspot SAR evaluations for this device were performed at the maximum allowed output power when Hotspot is enabled. FCC KDB Publication 616217 D04v01r02 Sec.6 was used as a guideline for selecton SAR test distances for device when being used in phablet use conditions.

The reduced powers for the power reduction mechanisms were conformed via conducted power measurements at the RF Port .

2.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

2.3.1 Maximum PCE Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot
GSM/GPRS/ EDGE 850	Maximum	34.0	34.0	31.0	30.0	29.0	28.5	26.5	25.5	24.5
	Nominal	33.0	33.0	30.0	29.0	28.0	27.5	25.5	24.5	23.5
GSM/GPRS/ EDGE 1900	Maximum	31.0	31.0	28.5	27.0	26.0	27.5	26.0	25.0	24.0
	Nominal	30.0	30.0	27.5	26.0	25.0	26.5	25.0	24.0	23.0

Mode/Band		Modulated Average (dBm)			
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
UMTS Band 5 (850 MHz)	Maximum	24.8	23.3	23.3	23.3
	Nominal	23.8	22.3	22.3	22.3
UMTS Band 2 (1900 MHz)	Maximum	24.5	23.0	23.0	23.0
	Nominal	23.5	22.0	22.0	22.0

Mode / Band		Modulated Average (dBm)
LTE Band 5 (Cell)	Maximum	25.3
	Nominal	24.3
LTE TDD Band 41	Maximum	25.0
	Nominal	24.0

2.3.2 Reduced PCE Power

Mode / Band		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
		(dBm)	(dBm)	(dBm)	(dBm)
UMTS Band 5(850 MHz) Hotspot mode	Maximum	22.0	21.0	21.0	21.0
	Nominal	21.0	20.0	20.0	20.0
UMTS Band 2(1900 MHz) Hotspot mode	Maximum	20.0	19.0	19.0	19.0
	Nominal	19.0	18.0	18.0	18.0
UMTS Band 2(1900 MHz) Grip Sensor mode	Maximum	20.0	19.0	19.0	19.0
	Nominal	19.0	18.0	18.0	18.0

2.3.3 Maximum WLAN/ Bluetooth Power

Mode/Band				Modulated Average (dBm)				
Mode		Ch.		11a	11b	11g	11n	11ac
2.4 GHz WIFI		1~11	Maximum	N/A	19	16	16	N/A
			Nominal	N/A	18	15	15	N/A
5 GHz WIFI (20 MHz)	5200 MHz	36	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
		40~48	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
	5300 MHz	52~60	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
		64	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
	5500 MHz	100~144	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
	5800 MHz	149~165	Maximum	15	N/A	N/A	14	12
			Nominal	14	N/A	N/A	13	11
5 GHz WIFI (40 MHz)	5200 MHz	38	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
		46	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
	5300 MHz	54	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
		62	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
	5500 MHz	102	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
		118~142	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
	5800 MHz	151~159	Maximum	N/A	N/A	N/A	12	10
			Nominal	N/A	N/A	N/A	11	9
5 GHz WIFI (80 MHz)	5200 MHz	42	Maximum	N/A	N/A	N/A	N/A	10
			Nominal	N/A	N/A	N/A	N/A	9
	5300 MHz	58	Maximum	N/A	N/A	N/A	N/A	10
			Nominal	N/A	N/A	N/A	N/A	9
	5500 MHz	106	Maximum	N/A	N/A	N/A	N/A	10
			Nominal	N/A	N/A	N/A	N/A	9
		122~138	Maximum	N/A	N/A	N/A	N/A	10
			Nominal	N/A	N/A	N/A	N/A	9
	5800 MHz	155	Maximum	N/A	N/A	N/A	N/A	10
			Nominal	N/A	N/A	N/A	N/A	9

Mode / Band		Modulated Average (dBm)
Bluetooth	Maximum	11.0
	Nominal	10.0
Bluetooth LE	Maximum	6.0
	Nominal	5.0

2.4 LTE information

Item.		Description		
Frequency Range	LTE Band 5 (Cell)	824.7 – 848.3 MHz		
	LTE TDD Band 41	2555 MHz – 2655 MHz		
Channel Bandwidths	LTE Band 5 (Cell)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz		
	LTE TDD Band 41	5 MHz, 10 MHz, 15 MHz, 20 MHz		
Channel Numbers & Freq.(MHz)		Low	Mid	High
LTE Band 5	1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
	3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
	5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
	10 MHz	829.0 (20450)	836.5 (20525)	844.0 (20600)
LTE TDD Band 41	5 MHz	2 557.5 (40265)	2 605.0 (40740)	2 652.5 (41215)
	10 MHz	2 560.0 (40290)	2 605.0 (40740)	2 650.0 (41190)
	15 MHz	2 562.5 (40315)	2 605.0 (40740)	2 647.5 (41165)
	20 MHz	2 565.0 (40340)	2 605.0 (40740)	2 645.0 (41140)
UE Category		Rel.12, DL UE Cat.7, UL UE Cat.13		
Modulations Supported in UL		QPSK, 16QAM, 64QAM		
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3		Yes		
A-MPR disabled for SAR Testing.		Yes		
LTE Carrier Aggregation		This device does not support downlink and uplink Carrier Aggregation for US region.		
LTE Release 10 information		This device does not support full CA features on 3GPP Release 10. The following LTE Release 10 features are not supported. Uplink and Downlink Carrier aggregations, Relay, HetNet, Enhanced MIMO, eICI, WiFi offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.		

2.5 Test Methodology and Procedures

The tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

- FCC KDB Publication 941225 D01 3G SAR Procedures v03r01
- FCC KDB Publication 941225 D06 Hot Spot SAR v02r01
- FCC KDB Publication 941225 D05 SAR for LTE Devices v02r05
- FCC KDB Publication 941225 D05A LTE Rel.10 KDB Inquiry sheet v01r02
- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 648474 D04 Handset SAR v01r03
- FCC KDB Publication 616217 D04 v01r02 (Proximity Sensor)
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02
- October 2013 TCB Workshop Notes (GPRS testing criteria)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)

2.6 DUT Antenna Locations

The overall dimensions of this device are > 9 X 5 cm. A diagram showing device antenna can be found in SAR_setup_photos. Since the diagonal dimension of this device is > 160 mm and < 200 mm, it is considered a “phablet”.

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering. Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth Tethering SAR were evaluated for BT BR tethering applications.

Mode	Rear	Front	Left	Right	Bottom	Top
GSM/GPRS/EDGE 850	Yes	Yes	Yes	Yes	Yes	No
GSM/GPRS/EDGE 1900	Yes	Yes	Yes	Yes	Yes	No
UMTS 850	Yes	Yes	Yes	Yes	Yes	No
UMTS 1900	Yes	Yes	Yes	Yes	Yes	No
LTE Band 5	Yes	Yes	Yes	Yes	Yes	No
LTE Band 41	Yes	Yes	No	Yes	Yes	No
2.4 GHz WLAN	Yes	Yes	No	Yes	No	Yes
5 GHz WLAN	Yes	Yes	No	Yes	No	Yes
Bluetooth	Yes	Yes	No	Yes	No	Yes

Particular EUT edges were not required to be evaluated for Bluetooth Tethering and Hotspot SAR if the edges were > 25 mm from the transmitting antenna according to FCC KDB 941225 D06v02r01 on page 2. The distance between the transmit antennas and the edges of the device are included in the filing.

* Note: All test configurations are based on front view position.

2.7 Near Field Communications (NFC) Antenna

This EUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in SAR _ Setup_ photos.

2.7 SAR Summation Scenario

According to FCC KDB 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown below paths and are mode in same rectangle to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Path 1

GSM/GPRS/EDGE
UMTS
LTE

Path 2

BT/WiFi

Simultaneous transmission paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB 447498 D01v06.

Simultaneous Transmission Scenarios				
Applicable Combination	Head	Body-Worn	Hotspot	Extremity
GSM Voice + 2.4 GHz WiFi	Yes	Yes	N/A	Yes
GSM Voice + 5 GHz WiFi	Yes	Yes	N/A	Yes
GSM Voice + 2.4 GHz Bluetooth	Yes*	Yes	N/A	Yes
GPRS + 2.4 GHz WiFi	N/A	N/A	Yes	Yes
GPRS + 5 GHz WiFi	N/A	N/A	Yes	Yes
GPRS + Bluetooth	N/A	N/A	Yes*	Yes
UMTS + 2.4 GHz WiFi	Yes	Yes	Yes	Yes
UMTS + 5 GHz WiFi	Yes	Yes	Yes	Yes
UMTS + 2.4 GHz Bluetooth	Yes*	Yes	Yes*	Yes
LTE + 2.4 GHz WiFi	Yes	Yes	Yes	Yes
LTE + 5 GHz WiFi	Yes	Yes	Yes	Yes
LTE+ 2.4 GHz Bluetooth	Yes*	Yes	Yes^	Yes

1. Bluetooth cannot transmit simultaneously with WLAN.
2. All licensed modes cannot transmit simultaneously.
3. UMTS +WLAN scenario also represents the UMTS Voice/DATA + WLAN hotspot scenario.
4. GPRS/EDGE does not support pre-installed VOIP applications.
5. The highest reported SAR for each exposure condition is used for SAR summation purpose.
6. Wi-Fi Hotspot is supported for 2.4GHz/ UNII-3 of 5GHz WLAN.
7. This device supports * Bluetooth tethering.
8. This device supports VoLTE.
9. This device not supports VoWIFI.
10. 5GHz Wireless Router is only supported for the UNII-3 by SW, therefore U-NII-1,U-NII2A and U-NII2C were not evaluated for wireless router conditions.

2.8 SAR Test Considerations

2.8.1 WiFi

Since wireless router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A & U-NII-2C WiFi, WiFi Hotspot SAR test and combinations are considered only 2.4 GHz and U-NII-3 for SAR with respected to wireless router configurations according to FCC KDB 941225 D06v02.

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg for 1g SAR and is less than 3.0 W/kg for 10g SAR, SAR is not required for U-NII-1 band according to FCC KDB 248227D01v02r01.

This device supports IEEE 802.11 ac with the following features:

a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 256 QAM is supported
d) TDWR channels are supported.
e) Straddle channels are supported
f) Band gap channels are supported

2.8.2 Bluetooth LE

Per FCC KDB 447498 D01v06, The SAR exclusion threshold for distance < 50mm is defined by the following equation:

$$\frac{MaxPowerofChannel(mW)}{TestSeparationDistance(mm)} * \sqrt{Frequency(GHz)} \leq 3.0(1g\ \ SAR), 7.5(10g\ \ SAR)$$

Mode		Frequency	Maximum Allowed Power	Separation Distance	≤ 3.0	≤ 7.5
		[MHz]	[mW]	[mm]	1-g SAR	10-g SAR
Bluetooth LE	Head SAR	2 480	4.0	5	1.3	
	Body Worn SAR		4.0	15	0.4	
	Tethering SAR		4.0	10	0.6	
	Extremity SAR		4.0	5		1.3

Based on the maximum conducted power of Bluetooth LE and antenna to use separation distance, Bluetooth LE SAR was not required [(4/5)*√2.480] = 1.3≤3.0, [(4/15)*√2.480] = 0.4≤3.0 for 1-g SAR, [(4/10)*√2.480] = 0.6≤3.0 for 1-g SAR, [(4/5)*√2.480] = 1.3≤7.5 for 10-g SAR.

The Reported SAR for WLAN and Bluetooth

The Reported SAR = The Measured SAR *- $\frac{Maximum\ \ tune\text{-}up\ \ (mW)}{Measured\ \ Conducted\ \ Power(mW)}$ * Duty factor

2.8.2 Licensed Transmitter(s)

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r05.

This Device suuprts 64QAM on the uplink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per section 5.1 of FCC KDB 941225 D05v02r05. SAR was not required for 64QAM sinse the highest maximum output power for 64QAM is ≤ 0.5 dB higher than the same configuration in QPSK and the reported SAR for QPSK configuration is ≤1.45 W/Kg, per section 5.2.4 fo FCC KDB941225 D05v02r05.

Per FCC KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Therefore, extremity SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR >1.2 W/kg. When hotspot mode applies, 10g SAR required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1g SAR > 1.2 W/kg.

Per FCC KDB 941225 D01v03r01, 12.2 kbps RMC is the primary mode and HSPA (HSUPA/HSDPA with RMC) is the secondary mode.

Per FCC KDB 941225 D01v03r01, The SAR test exclusion is applied to the secondary mode by the following equation.

$$Adjusted\ \ SAR = Highest\ \ Reported\ \ SAR * \frac{Secondary\ \ Max\ \ tune-up\ \ (mW)}{Primary\ \ Max\ \ tune\ \ tune-up(mW)} \leq 1.2\ \ \text{W/kg.}$$

Based on the highest Reported SAR, the secondary mode is not required.

Per FCC KDB 690783 1 D01 SAR Listings on Grants v01r03 and KDB 447498 D01 General RF Exposure Guidance v06 The SAR numbers listed must be consistent with the highest reported test results required by the published RF exposure KDB procedures. When the measured SAR is not at the maximum tune-up tolerance limit or maximum output power allowed for production units, the measured results are scaled to the maximum conditions to determine compliance; the scaled results are referred to as the reported SAR.

$$\text{The Reported SAR} = \text{The Measured SAR} *\text{-}\frac{Maximum\ \ tune-up\ \ (mW)}{Measured\ \ Conducted\ \ Power(mW)}$$

3. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right)$$

Figure 1. SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg)

$$SAR = \sigma E^2 / \rho$$

Where:
σ = conductivity of the tissue-simulant material (S/m)
ρ = mass density of the tissue-simulant material (kg/㎥)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

4. DESCRIPTION OF TEST EQUIPMENT

4.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC with Windows XP or Windows 7 is working with SAR Measurement system DASY4 & DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

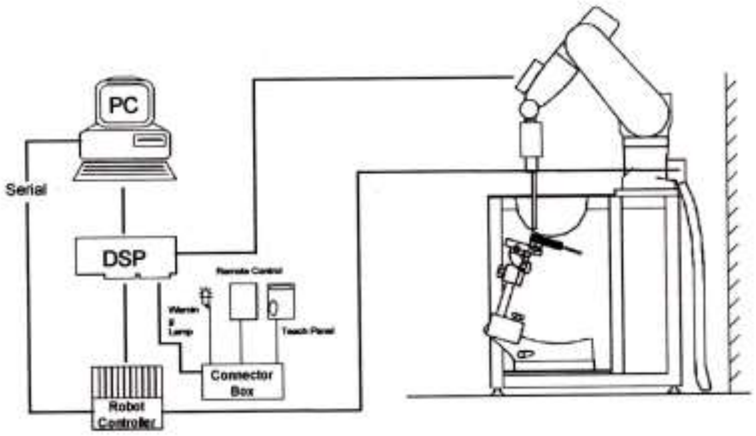


Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

5. SAR MEASUREMENT PROCEDURE

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the DUT's head and body area and the horizontal grid resolution was depending on the FCC KDB 865664 D01v01r04 table 4-1 & IEEE 1528-2013.

2. Based on step, the area of the maximum absorption was determined by sophisticated interpolations routines implemented in DASY software. When an Area Scan has measured all reachable point. DASY system computes the field maximal found in the scanned are, within a range of the maximum. SAR at this fixed point was measured and used as a reference value.

3. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB 865664 D01v01r04 table 4-1 and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (reference from the DASY manual.)

   a. The data at the surface were extrapolated, since the center of the dipoles is no more than 2.7 mm away from the tip of the probe (it is different from the probe type) and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan. If the value changed by more than 5 %, the SAR evaluation and drift measurements were repeated.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01r04 quoted below.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>$\frac{1}{2}\cdot\delta\cdot\ln(2)\pm0.5$ mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan Spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤15 mm
2-3 GHz: ≤12 mm</td><td>3-4 GHz: ≤12 mm
4-6 GHz: ≤10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan Spatial resolution: Δx_{zoom}, Δy_{zoom}</td><td>≤ 2 GHz: ≤8mm
2-3 GHz: ≤5mm*</td><td>3-4 GHz: ≤5 mm*
4-6 GHz: ≤4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan Spatial resolution normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{zoom}(n)$</td><td>≤ 5 mm</td><td>3-4 GHz: ≤4 mm
4-5 GHz: ≤3 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{zoom}(1)$: between 1st two Points closest to phantom surface</td><td>≤ 4 mm</td><td>3-4 GHz: ≤3 mm
4-5 GHz: ≤2.5 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td>$\Delta z_{zoom}(n>1)$: between subsequent Points</td><td colspan="2">$\leq 1.5\cdot\Delta z_{zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3-4 GHz: ≥28 mm
4-5 GHz: ≥25 mm
5-6 GHz: ≥22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

6. DESCRIPTION OF TEST POSITION

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE.” Each ERP is on the B-M (back-mouth) line located 15 mm behind the entrance-to-ear-canal (EEC) point, as shown in Figure 6-1. The Reference Plane is defined as passing through the two ear reference point and point M. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (See Figure 5-1), Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

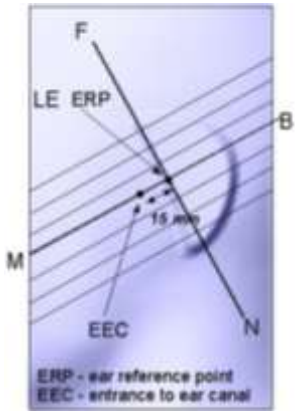


Figure 6-1
Close-up side view of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point”(see Figure 6-3). The acoustic output was than located at the same level as the center of the ear reference point. The device under test was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.

Figure 6-2
Front, back and side views of SAM Twin Phantom

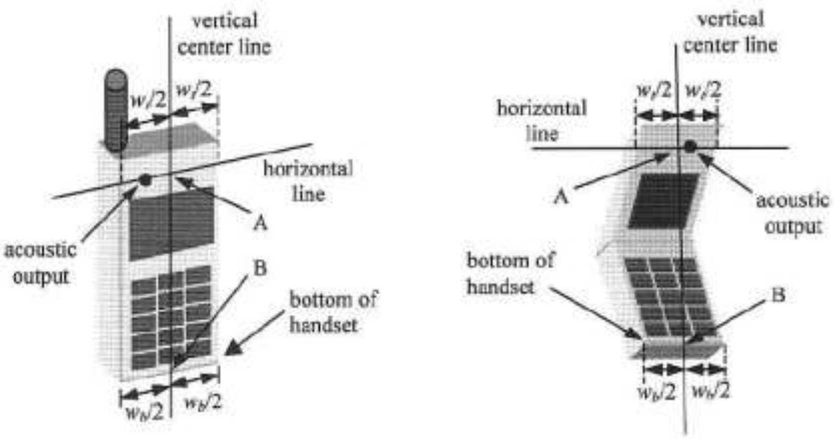


Figure 6-3. Handset vertical and horizontal reference lines

6.3 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameter; relative permittivity ε=3 and loss tangent σ =0.02.

6.4 Position for cheek

Figure 6.4. shows cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

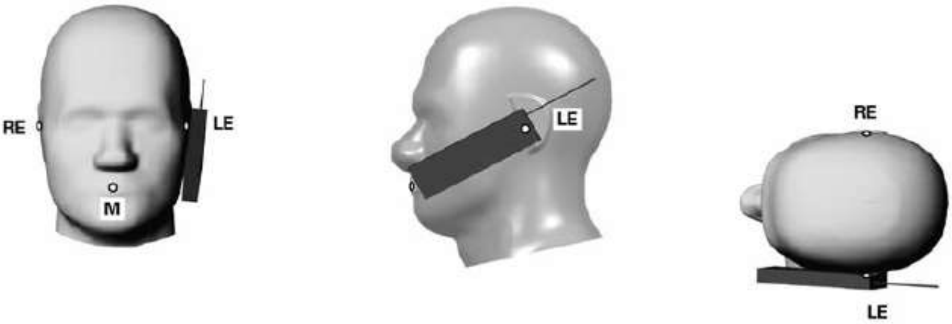


Figure 6.4 Cheek/ Touch position of the wireless device

6.5 Definition of the “tilted” position

Figure 6.5. shows tilted position. Place the device in the cheek position. Then while maintaining the orientation of the device, retract the device parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15˚

Figure 6.5. Tilt 15˚ position of the wireless device

6.6 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-dips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-6). Per FCC KDB Publication 648474 D04v01r03 Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in Body-worn accessories. The Body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for Body-worn accessory SAR compliance, without a headset connected to it.. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body- worn accessory with a headset attached to the handset.

Figure 6-6
Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-dip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (L x W ≥ 9cmx5 cm) are based on *a* composite test separation distance of 10 mm from the front back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the Body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some Body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot* feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

6.8 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions: i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear. the phablets procedures outlined in KDB Publication 648474 D04 v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worm accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

6.9 Additional Test Positions due to Proximity Conditions

This device uses a sensor to reduce output powers in extremity (hand-held) use conditions.

When the sensor detects a user is touching the device on or near to the antenna the device reduces the maximum allowed output power However, the proximity sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 v01r02 Section 8 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. The smallest separation distance determined by the sensor triggering and sensor coverage for each applicable edge, minus 1 mm. was used as the test separation distance for SAR testing. Sensor triggering distance summary data is included in below table.

The proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.

6.10 Bluetooth tethering Configurations

Per May 2017 TCBC Workshop documents When Bluetooth tethering applies ,simultaneous transmission SAR needs consideration

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering.
Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth tethering SAR were evaluated for BT BR tethering applications

7. RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population	CONTROLLED ENVIRONMENT Occupational
	(W/kg) or (mW/g)	(W/kg) or (mW/g)
SPATIAL PEAK SAR * (Head)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

******* The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be mad fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e.as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

8. FCC SAR GENERAL MEASUREMENT PROCEDURES

Power Measurements for licensed transmitters are performed using a base simulator under digital average power.

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as Reported SAR. The highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8.2 3G SAR Test Reduction Procedure

8.2.1 GSM, GPRS AND EDGE

The following procedures may be considered for each frequency band to determine SAR test reduction for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance. GSM voice mode transmits with 1 time-slot. GPRS and EDGE may transmit up to 4 time slots in the 8 time-slot frame according to the multi-slot class implemented in a device.

8.2.2 SAR Test Reduction

In FCC KDB 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested

8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB 941225 D01v03r01 - 3G SAR Measurement Procedures
The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to Cheek for power drifts. If conducted Power deviations of more than 5 % occurred, the tests were repeated.

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in sec. 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.4.3 Body SAR measurements

SAR for body exposure configurations is measured using the 12.2kbps RMC with the TPC bits all “1s”. the 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using and applicable RMC configuration with the corresponding spreading code or DPDCHn, for the highest reported SAR configuration in 12.2kbps RMC.

8.4.4 SAR Measurements with Rel. 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using and FRC with H-SET 1 in Sub-test and a 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to release 6 HSPA test procedures. 8.4.5 SAR Measurement with Rel.6 HSUPA The 3G SAR test Reduction Procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, Using H-Set 1 and QPSK for FRC and a 12.2kbps RMC configured in Test Loop Mode 1 and Power Control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

8.4.5 SAR Measurements with Rel. 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

8.4.6 DC-HSDPA

SAR is required for Rel.8 DC-HSDPA when SAR is required for Rel.5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in table C.8.1.12 of 3GPP TS34.121-1 to determine SAR test reduction. Primary and secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

-

8.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r05 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluation SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

8.5.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

8.5.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36. 101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

8.5.3 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

8.5.4 Required RB Size and RB offsets for SAR testing

According to FCC KDB 941225 D05v02r05

a. Per sec 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/Kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Sec 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Sec 4.2.1.

c. Per Sec. 4.2.3, QPSK SAR is not required for the 100% all0cation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Sec. 4.2.4 and 4.3, SAR test for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sec. 4.2.1 through 4.2.3 is less than or equal to 1/2 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/Kg.

8.5.6 LTE(TDD) Considerations

According to KDB 941225 D05v02r05, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33 %) using Uplink-downlink configuration 0 and Special subframe configuration 6.

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special sub frame configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle – Extended cyclic prefix in uplink x (T_s) x # of S + # of U
Example for calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = (5120 x [1/(15000 x 2048)] x 2 + 0.006)/0.01 = 63.33 %
Where
T_s = 1/(15000 x 2048) seconds

8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

8.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR system to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92-96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

8.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR.

8.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 -5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, SAR must be considered for these channels.

8.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating nest to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test positions are measured.

8.6.5 2.4 GHz SAR test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS is that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed.

8.6.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate and lowest order 802.11 a/g/n/ac mode. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11 ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.2., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 GHZ and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements.

8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position on procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg for 1g SAR and ≤ 3.0 W/kg for 10g SAR, no additional SAR tests for the subsequent test configurations are required.

9. OUTPUT POWER SPECIFICATIONS

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

9.1 GSM Maximum Conducted Output Power

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
Maximum		**34.00**	**34.00**	**31.00**	**30.00**	**29.00**	**28.50**	**26.50**	**25.50**	**24.50**
Nominal		**33.00**	**33.00**	**30.00**	**29.00**	**28.00**	**27.50**	**25.50**	**24.50**	**23.50**
GSM 850	128	32.13	32.11	30.05	28.82	27.31	26.50	25.36	24.12	23.19
	190	32.43	32.40	29.70	28.21	27.47	26.26	24.94	23.72	22.67
	251	32.12	32.09	29.94	28.88	27.37	25.96	24.82	23.65	22.89
Maximum		**31.00**	**31.00**	**28.50**	**27.00**	**26.00**	**27.50**	**26.00**	**25.00**	**24.00**
Nominal		**30.00**	**30.00**	**27.50**	**26.00**	**25.00**	**26.50**	**25.00**	**24.00**	**23.00**
GSM 1900	512	29.52	29.49	27.55	25.87	24.62	25.55	24.83	23.74	22.81
	661	29.50	29.44	27.54	25.86	24.60	25.41	25.04	23.95	22.75
	810	29.40	29.36	27.35	25.80	24.80	25.59	24.93	23.80	22.75

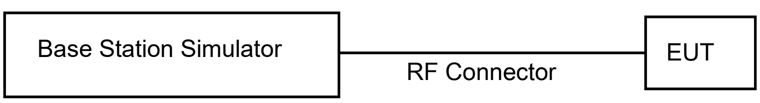
GSM Conducted output powers (Frame-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
Maximum		**24.97**	**24.97**	**24.98**	**25.74**	**25.99**	**19.47**	**20.48**	**21.24**	**21.49**
Nominal		**23.97**	**23.97**	**23.98**	**24.74**	**24.99**	**18.47**	**19.48**	**20.24**	**20.49**
GSM 850	128	23.10	23.08	24.03	24.56	24.30	17.47	19.34	19.86	20.18
	190	23.40	23.37	23.68	23.95	24.46	17.23	18.92	19.46	19.66
	251	23.09	23.06	23.92	24.62	24.36	16.93	18.80	19.39	19.88
Maximum		**21.97**	**21.97**	**22.48**	**22.74**	**22.99**	**18.47**	**19.98**	**20.74**	**20.99**
Nominal		**20.97**	**20.97**	**21.48**	**21.74**	**21.99**	**17.47**	**18.98**	**19.74**	**19.99**
GSM 1900	512	20.49	20.46	21.53	21.61	21.61	16.52	18.81	19.48	19.80
	661	20.47	20.41	21.52	21.60	21.59	16.38	19.02	19.69	19.74
	810	20.37	20.33	21.33	21.54	21.79	16.56	18.91	19.54	19.74

Note:

Time slot average factor is as follows:
1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB
2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB
3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB
4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

GSM Class : B
GSM voice: Head SAR , Body worn SAR
GPRS/EDGE Multi-slots 33 : Hotspot SAR with GPRS/EDGE
Multi-slot Class 33 with CS 1 (GMSK)



9.2 UMTS

HSPA+
This DUT is only capable of QPSK HSPA+ in uplink. Therefore, the RF conducted power is not measured according to 941225 D01 3G SAR.

9.2.1 Maximum Conducted Power

WCDMA Band 5

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 5 [dBm]			
		Subtest	UL 4132 DL 4357	UL 4183 DL 4408	UL 4233 DL 4458	3GPP MPR [dB]
99	WCDMA	12.2 kbps RMC	23.85	23.69	23.57	-
99		12.2 kbps AMR	23.84	23.68	23.57	-
5	HSDPA	Subtest 1	22.74	22.56	22.46	0
5		Subtest 2	22.75	22.57	22.48	0
5		Subtest 3	22.26	22.08	21.98	0.5
5		Subtest 4	22.25	22.08	21.98	0.5
6	HSUPA	Subtest 1	22.75	22.58	22.49	0
6		Subtest 2	20.75	20.59	20.49	2
6		Subtest 3	21.74	21.58	21.49	1
6		Subtest 4	20.75	20.58	20.48	2
6		Subtest 5	22.73	22.57	22.48	0
8	DC-HSDPA	Subtest 1	22.80	22.51	22.45	0
8		Subtest 2	22.81	22.51	22.45	0
8		Subtest 3	22.29	22.02	21.95	0.5
8		Subtest 4	22.28	22.01	21.95	0.5

WCDMA Average Conducted output powers

WCDMA Band 2

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	3GPP MPR [dB]
99	WCDMA	12.2 kbps RMC	23.62	23.67	23.59	-
99	WCDMA	12.2 kbps AMR	23.61	23.67	23.60	-
5	HSDPA	Subtest 1	22.53	22.59	22.58	0
5		Subtest 2	22.53	22.61	22.57	0
5		Subtest 3	22.04	22.12	22.08	0.5
5		Subtest 4	22.04	22.13	22.08	0.5
6	HSUPA	Subtest 1	22.55	22.61	22.59	0
6		Subtest 2	20.54	20.62	20.58	2
6		Subtest 3	21.54	21.62	21.60	1
6		Subtest 4	20.53	20.61	20.59	2
6		Subtest 5	22.54	22.62	22.59	0
8	DC-HSDPA	Subtest 1	22.35	22.41	22.45	0
8		Subtest 2	22.36	22.40	22.45	0
8		Subtest 3	21.86	21.91	21.96	0.5
8		Subtest 4	21.85	21.92	21.96	0.5

WCDMA Average Conducted output powers

9.2.2 Reduced PCE Power

WCDMA Band 5 (Hotspot)

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 5 [dBm]			
		Subtest	UL 4132 DL 4357	UL 4183 DL 4408	UL 4233 DL 4458	3GPP MPR [dB]
99	WCDMA	12.2 kbps RMC	21.24	21.06	20.95	-
99		12.2 kbps AMR	21.24	21.06	20.94	-
5	HSDPA	Subtest 1	20.11	19.96	19.85	0
5		Subtest 2	20.14	19.97	19.86	0
5		Subtest 3	19.65	19.45	19.37	0.5
5		Subtest 4	19.65	19.46	19.36	0.5
6	HSUPA	Subtest 1	20.13	19.95	19.86	0
6		Subtest 2	18.13	17.95	17.87	2
6		Subtest 3	19.13	18.96	18.88	1
6		Subtest 4	18.13	17.95	17.88	2
6		Subtest 5	20.12	19.96	19.87	0
8	DC-HSDPA	Subtest 1	20.15	19.93	19.89	0
8		Subtest 2	20.15	19.94	19.89	0
8		Subtest 3	19.67	19.41	19.39	0.5
8		Subtest 4	19.66	19.42	19.40	0.5

WCDMA Average Conducted output powers

WCDMA Band 2 (Hotspot)

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	19.09	19.13	19.08	-
99	WCDMA	12.2 kbps AMR	19.09	19.14	19.09	-
5	HSDPA	Subtest 1	18.01	18.06	18.04	0
5		Subtest 2	18.02	18.09	18.06	0
5		Subtest 3	17.51	17.60	17.56	0.5
5		Subtest 4	17.52	17.59	17.55	0.5
6	HSUPA	Subtest 1	18.02	18.08	18.06	0
6		Subtest 2	16.04	16.11	16.08	2
6		Subtest 3	17.04	17.10	17.09	1
6		Subtest 4	16.02	16.10	16.09	2
6		Subtest 5	18.05	18.09	18.07	0
8	DC-HSDPA	Subtest 1	17.83	17.93	17.93	0
8		Subtest 2	17.83	17.95	17.96	0
8		Subtest 3	17.33	17.45	17.45	0.5
8		Subtest 4	17.33	17.45	17.44	0.5

WCDMA Average Conducted output powers

WCDMA Band 2 (Grip Sensor)

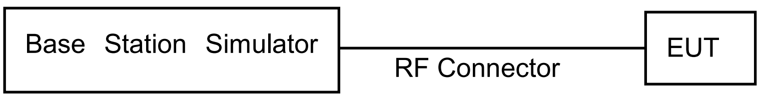
3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	19.09	19.15	19.09	-
99	WCDMA	12.2 kbps AMR	19.09	19.15	19.10	-
5	HSDPA	Subtest 1	18.01	18.08	18.05	0
5		Subtest 2	18.02	18.08	18.07	0
5		Subtest 3	17.52	17.59	17.57	0
5		Subtest 4	17.52	17.59	17.56	0
6	HSUPA	Subtest 1	18.01	18.10	18.07	0
6		Subtest 2	16.04	16.10	16.08	0
6		Subtest 3	17.03	17.09	17.08	0
6		Subtest 4	16.01	16.10	16.09	0
6		Subtest 5	18.03	18.10	18.08	0
8	DC-HSDPA	Subtest 1	17.82	17.87	17.95	0
8		Subtest 2	17.84	17.89	17.96	0
8		Subtest 3	17.33	17.39	17.44	0
8		Subtest 4	17.33	17.39	17.45	0

WCDMA Average Conducted output powers

DC-HSDPA Configurations

- 3GPP specification TS 34.121-1 Release 8. was used for used for DC-HSDPA guidance.
- H-set 12(QPSK)was conformed to be used during DC-HSDPA measurements.

It is expected by the manufacturer that MPR for some HSPA Subtests may be up to 2 dB more than specified by 3GPP, But also as low as 1 dB according to the chipset implementation in this model to match manufacturer.



9.3 LTE

9.3.1 Maximum Output Power

- LTE Band 5 _ 1.4 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				20407 824.7 MHz	20525 836.5 MHz	20643 848.3 MHz	[dB]	[dB]
1.4 MHz	QPSK	1	0	23.52	23.32	23.03	0	0
		1	3	23.62	23.43	23.08	0	0
		1	5	23.51	23.32	22.98	0	0
		3	0	23.51	23.45	23.05	0	0
		3	1	23.53	23.46	23.10	0	0
		3	3	23.49	23.42	23.03	0	0
		6	0	22.63	22.52	22.41	0-1	1
	16QAM	1	0	22.97	23.01	22.71	0-1	1
		1	3	23.03	23.12	22.80	0-1	1
		1	5	22.93	23.07	22.73	0-1	1
		3	0	22.75	22.65	22.45	0-1	1
		3	1	22.78	22.70	22.48	0-1	1
		3	3	22.69	22.64	22.42	0-1	1
		6	0	21.85	21.67	21.53	0-2	2
	64QAM	1	0	22.03	21.82	21.60	0-2	2
		1	3	22.07	21.93	21.67	0-2	2
		1	5	21.95	21.82	21.60	0-2	2
		3	0	21.90	21.79	21.68	0-2	2
		3	1	21.97	21.82	21.75	0-2	2
		3	3	21.86	21.76	21.68	0-2	2
		6	0	20.68	20.62	20.46	0-3	3

- LTE Band 5 _ 3 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				20415 825.5 MHz	20525 836.5 MHz	20635 847.5 MHz	[dB]	[dB]
3 MHz	QPSK	1	0	23.57	23.46	23.08	0	0
		1	7	23.66	23.56	23.15	0	0
		1	14	23.57	23.48	23.04	0	0
		8	0	22.67	22.60	22.44	0-1	1
		8	3	22.66	22.62	22.44	0-1	1
		8	7	22.67	22.61	22.41	0-1	1
		15	0	22.68	22.61	22.45	0-1	1
	16QAM	1	0	22.86	22.73	22.44	0-1	1
		1	7	22.94	22.77	22.51	0-1	1
		1	14	22.82	22.71	22.42	0-1	1
		8	0	21.86	21.65	21.57	0-2	2
		8	3	21.90	21.70	21.63	0-2	2
		8	7	21.83	21.62	21.55	0-2	2
		15	0	21.84	21.60	21.57	0-2	2
	64QAM	1	0	22.06	21.73	21.54	0-2	2
		1	7	22.11	21.98	21.60	0-2	2
		1	14	22.01	21.90	21.49	0-2	2
		8	0	20.74	20.73	20.55	0-3	3
		8	3	20.76	20.72	20.71	0-3	3
		8	7	20.72	20.71	20.54	0-3	3
		15	0	20.76	20.60	20.64	0-3	3

- LTE Band 5 _ 5 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm)			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20425 826.5 MHz	20525 836.5 MHz	20625 846.5 MHz	[dB]	[dB]
5 MHz	QPSK	1	0	23.54	23.50	23.26	0	0
		1	12	23.54	23.43	23.23	0	0
		1	24	23.51	23.40	23.11	0	0
		12	0	22.73	22.58	22.62	0-1	1
		12	6	22.72	22.59	22.64	0-1	1
		12	11	22.70	22.58	22.46	0-1	1
		25	0	22.65	22.59	22.47	0-1	1
	16QAM	1	0	22.95	23.12	22.98	0-1	1
		1	12	22.89	23.09	22.89	0-1	1
		1	24	22.80	23.04	22.97	0-1	1
		12	0	21.76	21.66	21.61	0-2	2
		12	6	21.79	21.66	21.70	0-2	2
		12	11	21.74	21.63	21.65	0-2	2
		25	0	21.70	21.72	21.54	0-2	2
	64QAM	1	0	22.07	21.62	21.59	0-2	2
		1	12	22.00	21.61	21.42	0-2	2
		1	24	21.95	21.70	21.46	0-2	2
		12	0	20.77	20.71	20.72	0-3	3
		12	6	20.76	20.76	20.72	0-3	3
		12	11	20.77	20.67	20.71	0-3	3
		25	0	20.80	20.74	20.67	0-3	3

- LTE Band 5 _ 10 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power (dBm) 20525 836.5 MHz	MPR Allowed Per 3GPP [dB]	MPR [dB]
10 MHz	QPSK	1	0	**23.47**	0	0
		1	24	23.44	0	0
		1	49	23.34	0	0
		25	0	**22.64**	0-1	1
		25	12	22.61	0-1	1
		25	24	22.56	0-1	1
		50	0	22.61	0-1	1
	16QAM	1	0	22.84	0-1	1
		1	24	22.85	0-1	1
		1	49	22.73	0-1	1
		25	0	21.74	0-2	2
		25	12	21.76	0-2	2
		25	24	21.70	0-2	2
		50	0	21.67	0-2	2
	64QAM	1	0	21.75	0-2	2
		1	24	21.74	0-2	2
		1	49	21.63	0-2	2
		25	0	20.66	0-3	3
		25	12	20.66	0-3	3
		25	24	20.60	0-3	3
		50	0	20.68	0-3	3

Note: LTE Band 5 at 10 MHz Bandwidth does not support three non-overlapping channels. Per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the mid channel of the group of overlapping channels should be selected for testing.

- LTE TDD Band 41 _ 5 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40265 2557.5 MHz	40740 2605 MHz	41215 2652.5 MHz	[dB]	[dB]
5 MHz	QPSK	1	0	23.25	23.23	23.44	0	0
		1	12	23.30	23.21	23.45	0	0
		1	24	23.29	23.14	23.45	0	0
		12	0	22.31	22.41	22.45	0-1	1
		12	6	22.32	22.36	22.49	0-1	1
		12	11	22.34	22.31	22.53	0-1	1
		25	0	22.34	22.37	22.55	0-1	1
	16QAM	1	0	22.36	22.50	22.63	0-1	1
		1	12	22.45	22.46	22.66	0-1	1
		1	24	22.44	22.44	22.68	0-1	1
		12	0	21.34	21.48	21.54	0-2	2
		12	6	21.39	21.46	21.60	0-2	2
		12	11	21.36	21.39	21.59	0-2	2
		25	0	21.42	21.58	21.67	0-2	2
	64QAM	1	0	21.10	21.34	21.39	0-2	2
		1	12	21.15	21.19	21.38	0-2	2
		1	24	21.19	21.27	21.40	0-2	2
		12	0	20.38	20.48	20.59	0-3	3
		12	6	20.43	20.46	20.63	0-3	3
		12	11	20.40	20.44	20.63	0-3	3
		25	0	20.44	20.62	20.68	0-3	3

- **LTE TDD Band 41 _ 10 MHz Bandwidth**

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40290 2560 MHz	40740 2605 MHz	41190 2650 MHz	[dB]	[dB]
10 MHz	QPSK	1	0	23.22	23.18	23.43	0	0
		1	24	23.32	23.17	23.49	0	0
		1	49	23.22	23.16	23.45	0	0
		25	0	21.85	21.81	22.03	0-1	1
		25	12	21.92	21.92	22.00	0-1	1
		25	24	21.80	21.94	22.03	0-1	1
		50	0	21.81	21.88	22.10	0-1	1
	16QAM	1	0	22.38	22.51	22.66	0-1	1
		1	24	22.48	22.46	22.71	0-1	1
		1	49	22.41	22.44	22.64	0-1	1
		25	0	21.42	21.48	21.70	0-2	2
		25	12	21.50	21.60	21.63	0-2	2
		25	24	21.42	21.45	21.62	0-2	2
		50	0	21.35	21.60	21.72	0-2	2
	64QAM	1	0	21.12	21.25	21.46	0-2	2
		1	24	21.21	21.22	21.44	0-2	2
		1	49	21.11	21.23	21.45	0-2	2
		25	0	20.42	20.53	20.72	0-3	3
		25	12	20.53	20.67	20.67	0-3	3
		25	24	20.42	20.46	20.64	0-3	3
		50	0	20.35	20.52	20.71	0-3	3

- LTE TDD Band 41 _ 15 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40315 2562.5 MHz	40740 2605 MHz	41165 2647.5 MHz	[dB]	[dB]
15 MHz	QPSK	1	0	23.71	23.31	23.57	0	0
		1	36	23.72	23.28	23.47	0	0
		1	74	23.68	23.32	23.46	0	0
		36	0	22.90	22.37	22.54	0-1	1
		36	18	22.84	22.46	22.61	0-1	1
		36	39	22.73	22.37	22.49	0-1	1
		75	0	22.83	22.39	22.53	0-1	1
	16QAM	1	0	22.89	22.47	22.65	0-1	1
		1	36	22.95	22.48	22.67	0-1	1
		1	74	22.89	22.52	22.62	0-1	1
		36	0	21.90	21.50	21.61	0-2	2
		36	18	21.87	21.58	21.71	0-2	2
		36	39	21.80	21.49	21.55	0-2	2
		75	0	21.91	21.57	21.70	0-2	2
	64QAM	1	0	21.64	21.18	21.43	0-2	2
		1	36	21.70	21.29	21.42	0-2	2
		1	74	21.66	21.31	21.37	0-2	2
		36	0	20.91	20.53	20.62	0-3	3
		36	18	20.92	20.57	20.70	0-3	3
		36	39	20.80	20.51	20.53	0-3	3
		75	0	20.87	20.56	20.71	0-3	3

- LTE TDD Band 41 _ 20 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40340 2565 MHz	40740 2605 MHz	41140 2645 MHz	[dB]	[dB]
20 MHz	QPSK	1	0	23.70	23.26	23.29	0	0
		1	49	**23.73**	23.22	23.49	0	0
		1	99	23.58	23.13	23.40	0	0
		50	0	**22.70**	22.34	22.60	0-1	1
		50	25	22.65	22.44	22.51	0-1	1
		50	49	22.64	22.28	22.55	0-1	1
		100	0	22.64	22.39	22.44	0-1	1
	16QAM	1	0	22.79	22.52	22.65	0-1	1
		1	49	22.91	22.50	22.70	0-1	1
		1	99	22.68	22.47	22.62	0-1	1
		50	0	21.76	21.51	21.71	0-2	2
		50	25	21.74	21.58	21.67	0-2	2
		50	49	21.79	21.48	21.66	0-2	2
		100	0	21.75	21.53	21.67	0-2	2
	64QAM	1	0	21.51	21.24	21.39	0-2	2
		1	49	21.65	21.25	21.45	0-2	2
		1	99	21.42	21.18	21.36	0-2	2
		50	0	20.79	20.50	20.72	0-3	3
		50	25	20.77	20.61	20.63	0-3	3
		50	49	20.80	20.48	20.66	0-3	3
		100	0	20.72	20.54	20.65	0-3	3

Note;

The EUT enables maximum power reduction in accordance with 3GPP 36.101. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

9.4 WiFi

9.4.1 WiFi Maximum Conducted Power

IEEE 802.11 Average Conducted Power

Mode	Freq. [MHz]	Channel	IEEE 802.11 (2.4 GHz) Conducted Power [dBm]
802.11b	2 412	1	16.62
	2 437	6	16.97
	2 462	11	17.01
802.11g	2 412	1	14.25
	2 437	6	14.62
	2 462	11	14.57
802.11n (HT20)	2 412	1	14.12
	2 437	6	14.47
	2 462	11	14.20

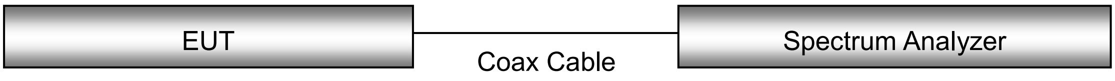
IEEE 802.11a Average RF Power– 20 MHz Bandwidth (Maximum Conducted Power)

Mode	Freq. [MHz]	Channel	IEEE 802.11 (5 GHz) Conducted Power [dBm]
802.11a	5 180	36	13.49
	5 200	40	13.45
	5 220	44	13.32
	5 240	48	13.36
	5 260	52	13.41
	5 280	56	13.52
	5 300	60	13.39
	5 320	64	13.44
	5 500	100	13.40
	5 600	120	13.29
	5 620	124	13.26
	5 720	144	13.69
	5 745	149	13.41
	5 785	157	13.41
	5 825	165	13.45

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission mode with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- Output power and SAR measurement is not required for 802.11n and 802.11ac channels when the specified tune-up tolerances for 802.11n and 802.11ac are lower than 802.11a by more than 1/2 dB and the measured SAR is $\leq$ 1.2 W/kg.

Test Configuration

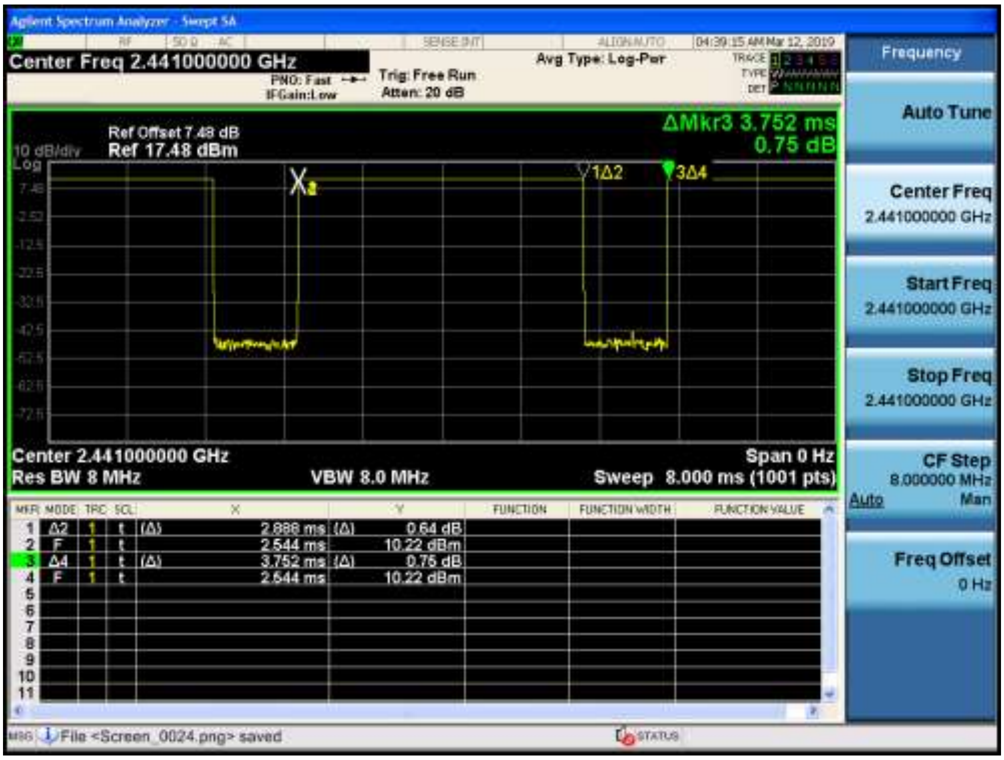


9.4.2 Bluetooth Conducted Power

The Burst averaged-conducted Power

Mode	Channel	Bluetooth Power
		[dBm]
DH5	0	10.19
	39	9.66
	78	9.64
2-DH5	0	9.57
	39	9.12
	78	9.11
3-DH5	0	9.51
	39	9.08
	78	9.10

Per October 2016 TCB Workshop Notes:
When call box and Bluetooth protocol are used for BT SAR measurement, time-domain plot is required to identify duty factor for supporting the test setup and result.
Bluetooth duty cycle was measured using Bluetooth tester equipment (CBT / R&S) with Bluetooth protocol. DH5 mode is the highest duty cycle and conducted power. SAR test were performed at DH5 mode.



Duty Cycle

= (BT-On time /BT-Full time) =(2.888/3.752) = 0.770 (DH5)

Duty factor= 1/Duty cycle : 1.299

10. SYSTEM VERIFICATION

10.1 Tissue Verification

The Head /body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification

Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
04/09/2019	22.6	835H	820	0.896	40.640	0.899	41.577	-0.33%	-2.25%
			835	0.912	40.390	0.900	41.500	1.33%	-2.67%
			850	0.927	40.235	0.916	41.500	1.20%	-3.05%
04/09/2019	22.6	1900H	1850	1.343	38.851	1.400	40.000	-4.07%	-2.87%
			1900	1.397	38.757	1.400	40.000	-0.21%	-3.11%
			1910	1.403	38.733	1.400	40.000	0.21%	-3.17%
04/10/2019	19.9	2450H	2400	1.729	39.608	1.756	39.290	-1.54%	0.81%
			2450	1.796	39.380	1.800	39.200	-0.22%	0.46%
			2500	1.850	39.257	1.855	39.140	-0.27%	0.30%
04/10/2019	19.9	2600H	2500	1.854	39.234	1.855	39.140	-0.05%	0.24%
			2600	1.944	38.793	1.964	39.010	-1.02%	-0.56%
			2700	2.076	38.654	2.073	38.880	0.14%	-0.58%
04/10/2019	20.2	5750H-5825H	5750	5.218	35.657	5.219	35.360	-0.02%	0.84%
			5800	5.065	35.440	5.270	35.300	-3.89%	0.40%
			5825	5.148	36.185	5.296	35.270	-2.79%	2.59%

Table for Body Tissue Verification

Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
04/09/2019	22.6	835B	820	0.942	56.647	0.969	55.260	-2.79%	2.51%
			835	0.961	56.490	0.970	55.200	-0.93%	2.34%
			850	0.970	56.345	0.988	55.150	-1.82%	2.17%
04/10/2019	21.2	835B	820	0.947	56.584	0.969	55.260	-2.27%	2.40%
			835	0.956	56.470	0.970	55.200	-1.44%	2.30%
			850	0.969	56.221	0.988	55.150	-1.92%	1.94%
04/09/2019	22.6	1900B	1850	1.478	53.633	1.520	53.300	-2.76%	0.62%
			1900	1.522	53.535	1.520	53.300	0.13%	0.44%
			1910	1.538	53.570	1.520	53.300	1.18%	0.51%
04/08/2019	20.6	2450B	2400	1.883	53.800	1.902	52.770	-1.00%	1.95%
			2450	1.946	53.631	1.950	52.700	-0.21%	1.77%
			2500	2.008	53.514	2.021	52.640	-0.64%	1.66%
04/08/2019	20.6	2600B	2500	2.008	53.514	2.021	52.640	-0.64%	1.66%
			2600	2.112	53.115	2.163	52.510	-2.36%	1.15%
			2700	2.244	53.044	2.305	52.380	-2.65%	1.27%
04/10/2019	21.2	5750B-5825B	5750	6.054	46.256	5.942	48.270	1.88%	-4.17%
			5800	6.335	46.162	6.000	48.200	5.58%	-4.23%
			5825	6.120	46.120	6.029	48.165	1.51%	-4.25%

10.2 System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 900 MHz / 2 450 MHz / 2 600 MHz/ / 5 750 MHz by using the system Verification kit. (Graphic Plots Attached)

*** Input Power: 50mW**

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) [W/kg]	50 mW Measured SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Limit [%]
835	04/09/2019	3967	4d165	Head	22.8	22.6	9.41	0.472	9.44	+ 0.32	± 10
835	04/09/2019	3967		Body	22.8	22.6	9.50	0.465	9.30	- 2.11	± 10
835	04/10/2019	3903		Body	21.5	21.2	9.50	0.455	9.10	- 4.21	± 10
1 900	04/09/2019	3967	5d0321	Head	22.8	22.6	40.0	2.06	41.2	+ 3.00	± 10
1 900	04/09/2019	3967		Body	22.8	22.6	39.7	1.82	36.4	- 8.31	± 10
2 450	04/10/2019	3076	743	Head	20.2	19.9	51.8	2.49	49.8	- 3.86	± 10
2 450	04/08/2019	3797		Body	20.8	20.6	49.9	2.34	46.8	- 6.21	± 10
2 600	04/10/2019	3076	1015	Head	20.2	19.9	58.1	2.90	58.0	- 0.17	± 10
2 600	04/08/2019	3797		Body	20.8	20.6	54.8	2.59	51.8	- 5.47	± 10
5 750	04/10/2019	7370	1253	Head	20.5	20.2	82.3	4.03	80.6	- 2.07	± 10
5 750	04/10/2019	3903		Body	21.5	21.2	77.3	3.71	74.2	- 4.01	± 10

10.3 System Verification Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system verification kit. (Graphic Plots Attached)

- Cabling the system, using the verification kit equipments.
- Generate about 50 mW Input level from the signal generator to the Dipole Antenna.
- Dipole antenna was placed below the flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

NOTE;
SAR Verification was performed according to the FCC KDB 865664 D01v01r04.

11. SAR TEST DATA SUMMARY from the worst case configuration of the basic model

11.1 HEAD SAR Measurement Results

GSM 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	190	GSM	34.0	32.43	-0.14	Right Cheek	1:8.3	0.024	1.435	0.034	1
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

GSM 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 880	661	GSM	31.0	29.50	-0.11	Left Cheek	1:8.3	0.072	1.413	0.102	2
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

UMTS 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		**(W/kg)**	
836.6	4183	RMC	24.8	23.69	-0.13	Right Cheek	1:1	0.052	1.291	0.067	3
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

UMTS 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		**(W/kg)**	
1 880	9400	RMC	24.5	23.67	0.01	Left Cheek	1:1	0.066	1.211	0.080	4
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

LTE Band 5 (Cell) Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
836.5	20525	QPSK	10	25.3	23.47	-0.15	Left Cheek	0	1	0	1:1	0.049	1.524	0.075	5
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

LTE TDD Band 41 Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	MPR (dB)	RB Size	RB offset	Duty Cycle	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
2 565	40340	QPSK	20	24.0	22.70	-0.12	Left Cheek	1	50	0	1:1.58	0.135	1.349	0.182	6
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

DTS Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
2 462	11	802.11b	22	1	19.0	17.01	-0.12	Left Tilt	98.96	0.428	0.326	1.581	1.011	0.521	7
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

NII Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
5 720	144	802.11a	20	6	15.0	13.69	-0.18	Left Tilt	97.47	0.235	0.067	1.352	1.026	0.093	8
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

DSS Head SAR

Frequency MHz	Frequency Ch.	Mode	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
2 402	0	Bluetooth DH5	11.0	10.19	0.09	Left Cheek	0.041	1.205	1.299	0.064	9
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

11.2 Body-worn SAR Measurement Results

GSM/UMTS Body-Worn SAR													
Frequency		Mode		Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.			(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	190	GSM 850 Voice		34.0	32.43	0.01	Rear	1:8.3	15	0.048	1.435	0.069	10
1 880	661	GSM 1900 Voice		31.0	29.50	0.12	Rear	1:8.3	15	0.064	1.413	0.090	11
836.6	4183	UMTS 850	RMC	24.8	23.69	0.01	Rear	1:1	15	0.081	1.291	0.105	12
1 880	9400	UMTS 1900	RMC	24.5	23.67	0.13	Rear	1:1	15	0.052	1.211	0.063	13
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram						

LTE Body-Worn SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
836.5	20525	LTE 5 QPSK	10	25.3	23.47	0.07	Rear	0	1	0	1:1	15	0.110	1.524	0.168	14
2 565	40340	LTE 41 QPSK	20	25.0	23.73	0.18	Rear	0	1	49	1:1.58	15	0.070	1.340	0.094	15
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Body-Worn SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 462	11	802.11b	22	1	19.0	17.01	-0.05	Rear	98.96	15	0.130	0.086	1.581	1.011	0.137	16
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

NII Body-Worn SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 825	165	802.11a	20	6	15.0	13.45	-0.01	Rear	97.47	15	0.0811	0.041	1.429	1.026	0.060	17
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

DSS Body-Worn SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Distance	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(mm)	(W/kg)		(Duty)	(W/kg)	
2 402	0	Bluetooth DH5	11.0	10.19	0.14	Rear	15	0.015	1.205	1.299	0.023	18
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg (mW/g) Averaged over 1 gram					

11.3 Hotspot SAR Measurement Results

GSM 850 Hotspot SAR

Frequency MHz	Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.6	190	GPRS 4Tx	29.0	27.47	0.11	Rear	1:2.07	10	0.286	1.422	0.407	19
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

GSM 1900 Hotspot SAR

Frequency MHz	Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
1 880	661	GPRS 4Tx	26.0	24.60	0.16	Rear	1:2.07	10	0.176	1.380	0.243	20
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

UMTS 850 Hotspot SAR

Frequency MHz	Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.6	4183	RMC	22.0	21.06	0.18	Rear	1:1	10	0.153	1.242	0.190	21
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

UMTS 1900 Hotspot SAR

Frequency MHz	Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
1 880	9400	RMC	20.0	19.13	-0.07	Rear	1:1	10	0.145	1.222	0.177	22
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

LTE Band 5 Hotspot SAR

Frequency MHz	Ch.	Mode	Band width (MHz)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	MPR (dB)	RB Size	RB offset	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.5	20525	QPSK	10	25.3	23.47	0.10	Rear	0	1	0	1:1	10	0.229	1.524	0.349	23
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE TDD Band 41 Hotspot SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
2 565	40340	QPSK	20	25.0	23.73	-0.18	Right	0	1	49	1:1.58	10	0.017	1.340	0.023	24
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Hotspot SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 462	11	802.11b	22	1	19.0	17.01	-0.17	Rear	98.96	10	0.391	0.230	1.581	1.011	0.368	25
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

5GHz WLAN Hotspot SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 825	165	802.11a	20	6	15.0	13.45	-0.16	Rear	97.47	10	0.112	0.056	1.429	1.026	0.082	26
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

DSS Tethering SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Distance	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(mm)	(W/kg)		(Duty)	(W/kg)	
2 402	0	Bluetooth DH5	11.0	10.19	0.04	Top	10	0.017	1.205	1.299	0.027	27
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg (mW/g) Averaged over 1 gram					

11.4 Phablet SAR Measurement Considerations

Per FCC KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Therefore, extremity SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR >1.2 W/kg. When hotspot mode applies, 10g SAR required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1g SAR > 1.2 W/kg.

Phablet SAR Consideration for UMTS 850 Hotspot Result

Frequency		Mode	Maximum Tune-Up Limit	Meas. Power	Test Position	Meas. SAR	Scaling Factor	Scaled SAR	Phablet SAR Required
MHz	Ch.		(dB)	(dB)		(W/kg)		(W/kg)	
836.6	4183	RMC	24.8	21.06	Rear	0.153	2.366	0.362	No

Phablet SAR Consideration for UMTS 1900 Hotspot Result

Frequency		Mode	Tune-Up Limit	Meas. Power	Test Position	Meas. SAR	Scaling Factor	Scaled SAR	Phablet SAR Required
MHz	Ch.		(dB)	(dB)		(W/kg)		(W/kg)	
1 880	9400	RMC	24.5	19.13	Rear	0.145	3.443	0.499	No

Conclusion :
The Reported Hotspot SAR results of GSM850 / GSM1900 /LTE B5/B41/WLAN 2.4(802.11b) /WLAN5Ghz were less than 1.2 W/kg ,so Phablet SAR measurement is not required.
The UMTSB5 / UMTS B2 with hotspot reduction were not required to Phablet SAR because the measurement result scaled to the Maximum Tune-up imit were less than 1.2W/kg.

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB 648474 D04v01r03, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is > 160 mm and < 200 mm. When hotspot mode applies, extremity SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (with tolerance) is 1 g SAR > 1.2 W/kg.
9. Per FCC KDB 865664 D01v01r04, variability SAR measurement were not performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg for 1g SAR and >2 for 10g SAR Please see Section 13 for variability analysis.
10. This device utilizes power reduction for some wireless mode and technologies, as outlined in sec. 2.3 The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous scenarios.
11. Since the Permissive changes of this device is only the change of the some Parts of the DUT that does not affect the RF exposure, the evaluation for this report were carried out under the condition of the worst case of the wireless band modes of the original compliance evaluation (Report No: HCT-SR-1903-FC002-R1)

GSM/GPRS Test Notes:

1. This EUT’S GSM and GPRS device class is B.
2. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
3. Justification for reduced test configurations per KDB 941225 D01v03r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power including tolerance was evaluated for SAR.

UMTS Notes:

1. The 12.2 kbps RMC mode is the primary mode per KDB 941225 D01v03r01.
2. UMTS SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941225 D05v02r05.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to target MPR is indicated alongside the SAR results.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.

WLAN Notes:

1. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. The duty cycle value for WLAN comes from the EMC report.

Bluetooth Notes:

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests mode type. Per October 2016 TCBC Workshop Notes, the reported SAR was scaled to 100% transmission duty factor to determine compliance. Please see sec.9.4.3 for the time-domain plot and calculation for duty factor of the device.
2. Head and Bluetooth tethering SAR were evaluated for BT BR tethering applications.

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12. SIMULTANEOUS SAR ANALYSIS

This device is contains transmitters that may operate simultaneously. Therefore,simultaneous transmission analysis is required. Per KDB Publication 447498 D01v06 4.3.2, simultaneous transmission SAR test exclusion may be applied when the sum of 1g SAR and 10g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6W/kg for 1g SAR and ≤4 W/kg for 10g SAR. The different test positions in an exposure condition may be considered collectively to determine SAR exclusion according to the sum of 1g or 10g SAR.

12.1 Simultaneous Transmission Summation for Head

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.034	0.521	0.555
	GSM 1900	0.102	0.521	0.623
	UMTS 850	0.067	0.521	0.588
	UMTS 1900	0.080	0.521	0.601
	LTE Band 5	0.075	0.521	0.596
	LTE Band 41	0.182	0.521	**0.703**

Simultaneous Transmission Summation Scenario with 5 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.034	0.093	0.127
	GSM 1900	0.102	0.093	0.195
	UMTS 850	0.067	0.093	0.160
	UMTS 1900	0.080	0.093	0.173
	LTE Band 5	0.075	0.093	0.168
	LTE Band 41	0.182	0.093	0.275

Simultaneous Transmission Summation Scenario with Bluetooth				
Exposure condition	Band	WWAN SAR (W/kg)	Bluetooth (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.034	0.064	0.098
	GSM 1900	0.102	0.064	0.166
	UMTS 850	0.067	0.064	0.131
	UMTS 1900	0.080	0.064	0.144
	LTE Band 5	0.075	0.064	0.139
	LTE Band 41	0.182	0.064	0.246

12.2 Simultaneous Transmission Summation for Body-Worn

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.069	0.137	0.206
		GSM 1900	0.090	0.137	0.227
		UMTS 850	0.105	0.137	0.242
		UMTS 1900	0.063	0.137	0.200
		LTE Band 5	0.168	0.137	**0.305**
		LTE Band 41	0.094	0.137	0.231

Simultaneous Transmission Summation Scenario with 5 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.069	0.060	0.129
		GSM 1900	0.090	0.060	0.150
		UMTS 850	0.105	0.060	0.165
		UMTS 1900	0.063	0.060	0.123
		LTE Band 5	0.168	0.060	0.228
		LTE Band 41	0.094	0.060	0.154

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.069	0.023	0.092
		GSM 1900	0.090	0.023	0.113
		UMTS 850	0.105	0.023	0.128
		UMTS 1900	0.063	0.023	0.086
		LTE Band 5	0.168	0.023	0.191
		LTE Band 41	0.094	0.023	0.117

12.3 Simultaneous Transmission Summation for Hotspot

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	0.407	0.368	**0.775**
		GSM 1900	0.243	0.368	0.611
		UMTS 850	0.190	0.368	0.558
		UMTS 1900	0.177	0.368	0.545
		LTE Band 5	0.349	0.368	0.717
		LTE Band 41	0.023	0.368	0.391

Simultaneous Transmission Summation Scenario with 5 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	0.407	0.082	0.489
		GSM 1900	0.243	0.082	0.325
		UMTS 850	0.190	0.082	0.272
		UMTS 1900	0.177	0.082	0.259
		LTE Band 5	0.349	0.082	0.431
		LTE Band 41	0.023	0.082	0.105

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Bluetooth Tethering	10	GSM 850	0.407	0.027	0.434
		GSM 1900	0.243	0.027	0.270
		UMTS 850	0.190	0.027	0.217
		UMTS 1900	0.177	0.027	0.204
		LTE Band 5	0.349	0.027	0.376
		LTE Band 41	0.023	0.027	0.050

12.4 Simultaneous Transmission Conclusion

The above numerical summed SAR Results are sufficient to determine that simultaneous transmission cases will not exceed the SAR Limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE1528-2013.

13. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

In accordance with KDB procedure 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz, SAR additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement variability was assessed using the following procedures for each frequency band:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg for 1g SAR or < 2.0 W/kg for 10g SAR; steps 2) through 4) do not apply.

2) When the original highest measured 1g SAR is ≥ 0.80 W/kg or 10g SAR ≥ 2.0W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg for 1g SAR or ≥ 3.625 W/kg for 10g SAR (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg for 1g SAR or ≥3.75 W/kg for 10g SAR and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

14. MEASUREMENT UNCERTAINTY

The measured SAR was <1.5 W/Kg for 1g SAR and <3.75 W/KgFor 10g SAR for all frequency bands. Therefore,per KDB Publication 865664 D01v01r04,the extended measurement uncertainty analysis per IEEE1528-2013 was not required.

15. SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F12/5K9GA1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F17/59CHA1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F13/5R4XF1/C/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F11/5K3RA1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F12/5K9GA1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/59CHA1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F13/5R4XF1/A/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F11/5K3RA1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1206 0513	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	010963	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1338 1332	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1203 0309	N/A	N/A	N/A
SPEAG	DAE4	1417	01/25/2019	Annual	01/25/2020
SPEAG	DAE4	648	05/25/2018	Annual	05/25/2019
SPEAG	DAE4	1225	11/16/2018	Annual	11/16/2019
SPEAG	DAE4	869	09/19/2018	Annual	09/19/2019
SPEAG	DAE3	466	08/22/2018	Annual	08/22/2019
SPEAG	E-Field Probe ES3DV3	3076	07/26/2018	Annual	07/26/2019
SPEAG	E-Field Probe EX3DV4	3797	11/22/2018	Annual	11/22/2019
SPEAG	E-Field Probe EX3DV4	7370	08/30/2018	Annual	08/30/2019
SPEAG	E-Field Probe EX3DV4	3903	09/24/2018	Annual	09/24/2019
SPEAG	E-Field Probe EX3DV4	3967	02/01/2019	Annual	02/01/2020
SPEAG	Dipole D835V2	4d165	09/18/2018	Annual	09/18/2019
SPEAG	Dipole D1900V2	5d032	02/21/2019	Annual	02/21/2020
SPEAG	Dipole D2450V2	743	01/28/2019	Annual	01/28/2020
SPEAG	Dipole D2600V2	1015	11/20/2018	Annual	11/20/2019
SPEAG	Dipole D5GHzV2	1253	11/22/2018	Annual	11/22/2019
Agilent	Power Meter E4419B	MY40511244	04/25/2018	Annual	04/25/2019
Agilent	Power Meter N1911A	MY45101406	09/06/2018	Annual	09/06/2019
Agilent	Power Sensor 8481A	SG1091286	10/11/2018	Annual	10/11/2019
Agilent	Power Sensor 8481A	MY41090873	10/11/2018	Annual	10/11/2019
Agilent	Power Sensor N1921A	MY55220026	09/06/2018	Annual	09/06/2019
SPEAG	DAKS 3.5	1038	05/29/2018	Annual	05/29/2019
SPEAG	VNA-R140	0141013	05/29/2018	Annual	05/29/2019
Agilent	WIRELESS COMMUNICATION E5515C	MY48361100	10/02/2018	Annual	10/02/2019
Agilent	Signal Generator N5182A	MY47070230	05/10/2018	Annual	05/10/2019
Agilent	11636B/Power Divider	58698	02/28/2019	Annual	03/06/2020
TESTO	175-H1/Thermometer	40331939309	01/29/2019	Annual	01/29/2020
TESTO	175-H1/Thermometer	40331915309	01/29/2019	Annual	01/29/2020
TESTO	175-H1/Thermometer	40332651310	01/29/2019	Annual	01/29/2020
TESTO	175-H1/Thermometer	40331949309	01/29/2019	Annual	01/29/2020

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
EMPOWER	RF Power Amplifier	1084	06/11/2018	Annual	06/11/2019
EMPOWER	RF Power Amplifier	1011	10/11/2018	Annual	10/11/2019
MICRO LAB	LP Filter / LA-15N	10453	10/11/2018	Annual	10/11/2019
MICRO LAB	LP Filter / LA-30N	-	10/11/2018	Annual	10/11/2019
MICRO LAB	LP Filter / LA-60N	32011	10/11/2018	Annual	10/11/2019
Apitech	Attenuator (3dB) 18B-03	1	06/07/2018	Annual	06/07/2019
Agilent	Attenuator (20dB) 33340C	13311	05/10/2018	Annual	05/10/2019
Agilent	Directional Bridge	3140A03878	06/11/2018	Annual	06/11/2019
Agilent	MXA Signal Analyzer N9020A	MY50510407	10/31/2018	Annual	10/31/2019
HP	Dual Directional Coupler	16072	10/11/2018	Annual	10/11/2019
Anritsu	Radio Communication Tester MT8820C	6200628628	07/19/2018	Annual	07/19/2019
Anritsu	Radio Communication Tester MT8821C	6201502997	08/13/2018	Annual	08/13/2019
R&S	Bluetooth CBT	100272	03/04/2019	Annual	03/04/2020

1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

16. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 - 2005.

These measurements were taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the abortion and distribution of electromagnetic energy in the body are very complex phenomena the depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 22.6 ℃
Ambient Temperature: 22.8 ℃
Test Date: 04/09/2019
Plot No.: 1

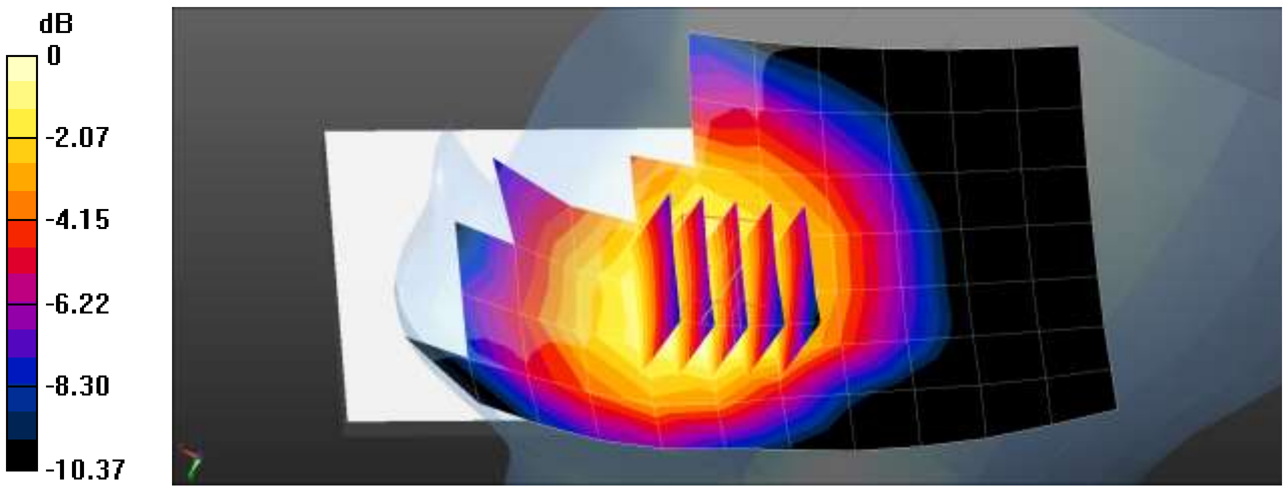
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.914 S/m; ε_r = 40.364; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.54, 9.54, 9.54); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

GSM835 Head Right Touch 190ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0289 W/kg

GSM835 Head Right Touch 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.313 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.0310 W/kg
SAR(1 g) = 0.024 W/kg; SAR(10 g) = 0.018 W/kg
Maximum value of SAR (measured) = 0.0285 W/kg



0 dB = 0.0285 W/kg = −15.45 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	2

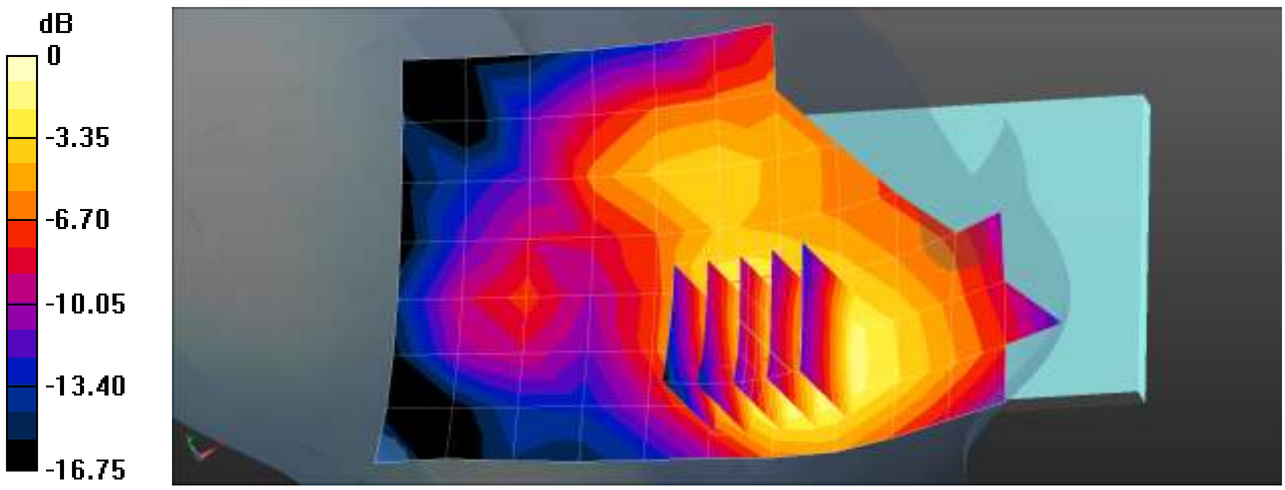
Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.378 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(8.12, 8.12, 8.12); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

GSM1900 Head Left Touch 661ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0926 W/kg

GSM1900 Head Left Touch 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.420 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.112 W/kg
SAR(1 g) = 0.072 W/kg; SAR(10 g) = 0.045 W/kg
Maximum value of SAR (measured) = 0.0967 W/kg



0 dB = 0.0967 W/kg = −10.15 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 22.6 ℃
Ambient Temperature: 22.8 ℃
Test Date: 04/09/2019
Plot No.: 3

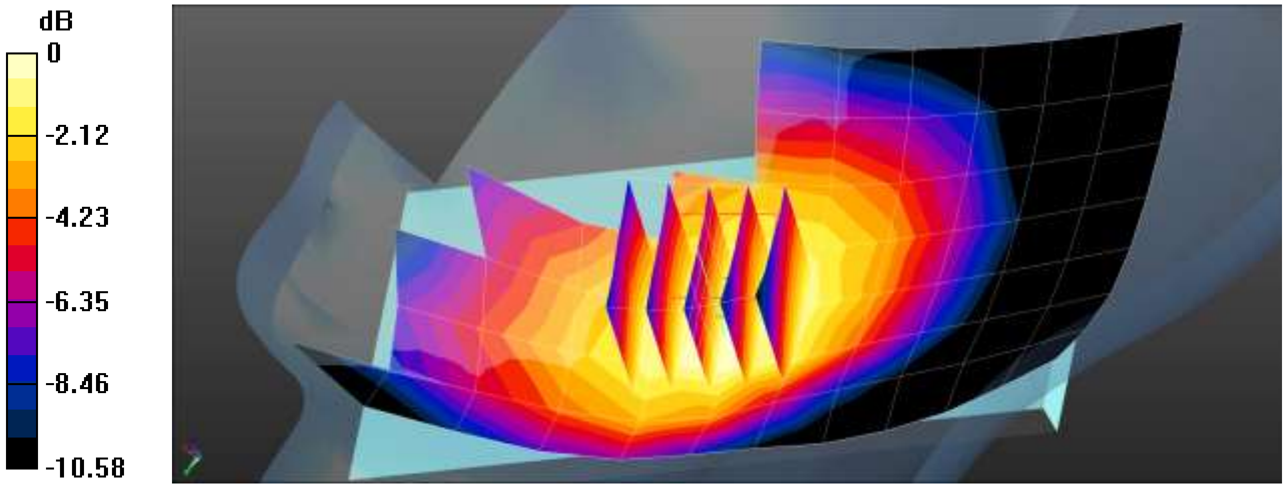
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.914 S/m; ε_r = 40.364; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.54, 9.54, 9.54); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA850 Head Right Touch 4183ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0619 W/kg

WCDMA850 Head Right Touch 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.106 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.0680 W/kg
SAR(1 g) = 0.052 W/kg; SAR(10 g) = 0.039 W/kg
Maximum value of SAR (measured) = 0.0628 W/kg



0 dB = 0.0628 W/kg = −12.02 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	4

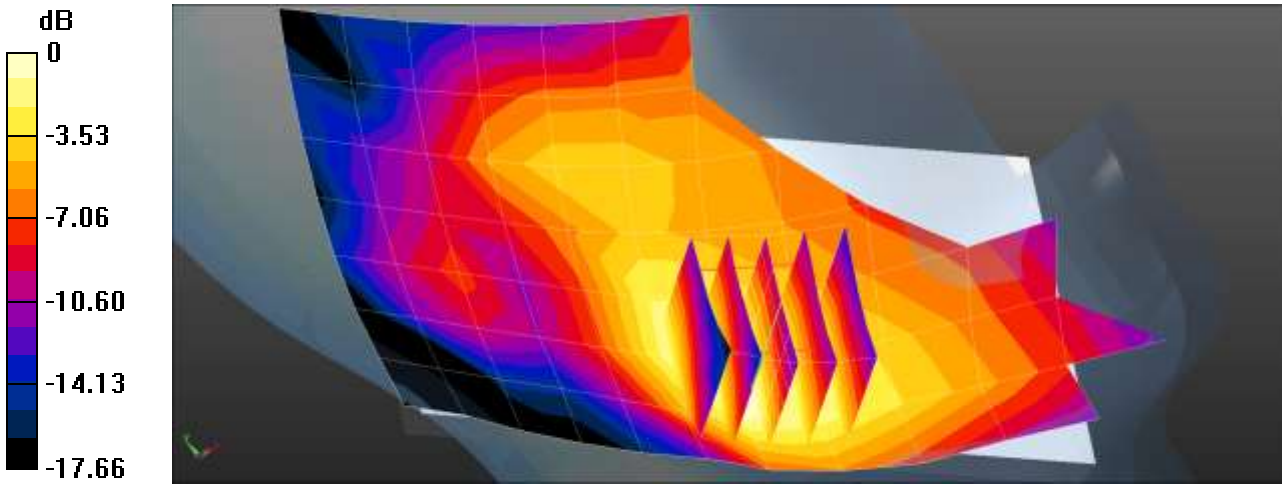
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.378 S/m; ε_r = 38.8; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(8.12, 8.12, 8.12); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA1900 Head Left Touch 9400ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0812 W/kg

WCDMA1900 Head Left Touch 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.437 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.102 W/kg
SAR(1 g) = 0.066 W/kg; SAR(10 g) = 0.041 W/kg
Maximum value of SAR (measured) = 0.0883 W/kg



0 dB = 0.0883 W/kg = -10.54 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 22.6 ℃
Ambient Temperature: 22.8 ℃
Test Date: 04/09/2019
Plot No.: 5

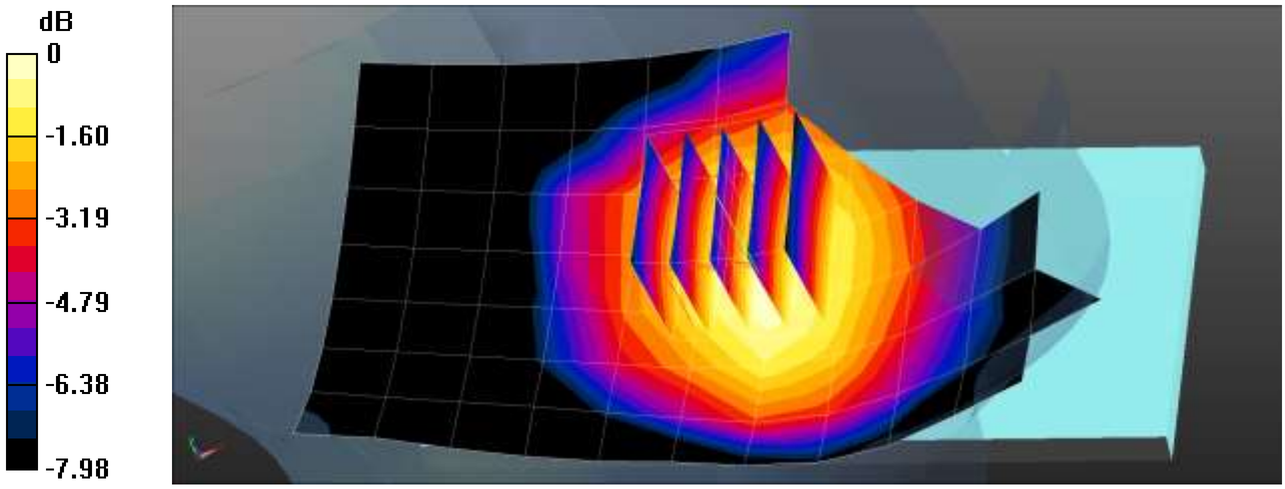
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.914 S/m; ε_r = 40.365; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.54, 9.54, 9.54); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 5 Head Left Touch QPSK 10MHz 1RB 0offset 20525ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0558 W/kg

LTE Band 5 Head Left Touch QPSK 10MHz 1RB 0offset 20525ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.554 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.0630 W/kg
SAR(1 g) = 0.049 W/kg; SAR(10 g) = 0.038 W/kg
Maximum value of SAR (measured) = 0.0573 W/kg



0 dB = 0.0573 W/kg = -12.42 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.9 ℃
Ambient Temperature: 20.2 ℃
Test Date: 04/10/2019
Plot No.: 6

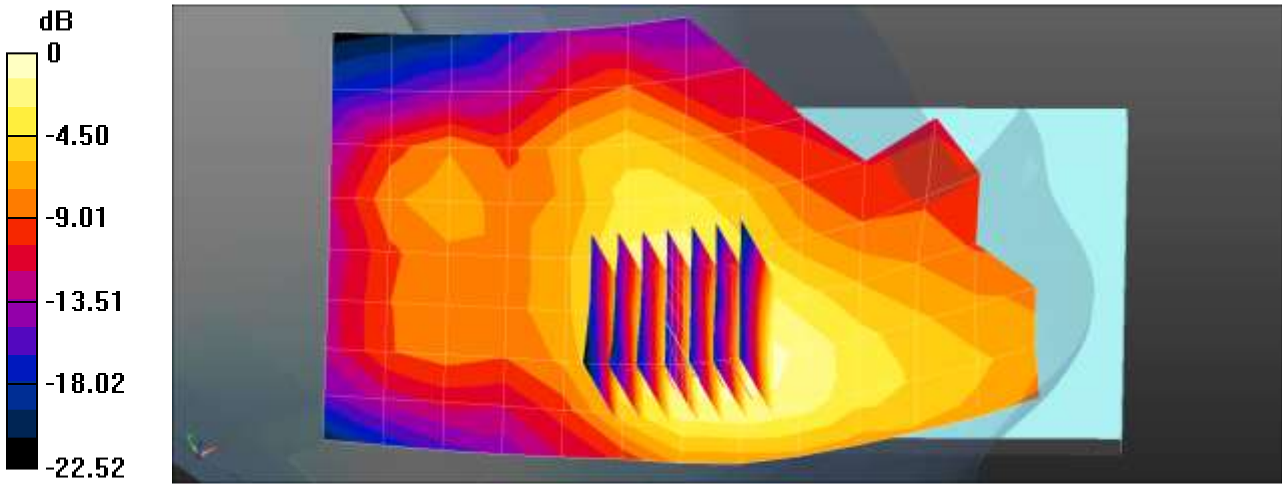
Communication System: UID 0, LTE Band 41 (FCC) (0); Frequency: 2565 MHz;Duty Cycle: 1:1.58052
Medium parameters used (interpolated): f = 2565 MHz; σ = 1.92 S/m; ε_r = 38.99; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(4.57, 4.57, 4.57); Calibrated: 2018-07-26;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: SAM with CRP v5.0
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 41 Head Left Touch QPSK 20MHz 50RB 0offset 40340ch/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.165 W/kg

LTE Band 41 Head Left Touch QPSK 20MHz 50RB 0offset 40340ch/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.190 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.258 W/kg
SAR(1 g) = 0.135 W/kg; SAR(10 g) = 0.073 W/kg
Maximum value of SAR (measured) = 0.169 W/kg



0 dB = 0.169 W/kg = -7.72 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.9 ℃
Ambient Temperature: 20.2 ℃
Test Date: 04/10/2019
Plot No.: 7

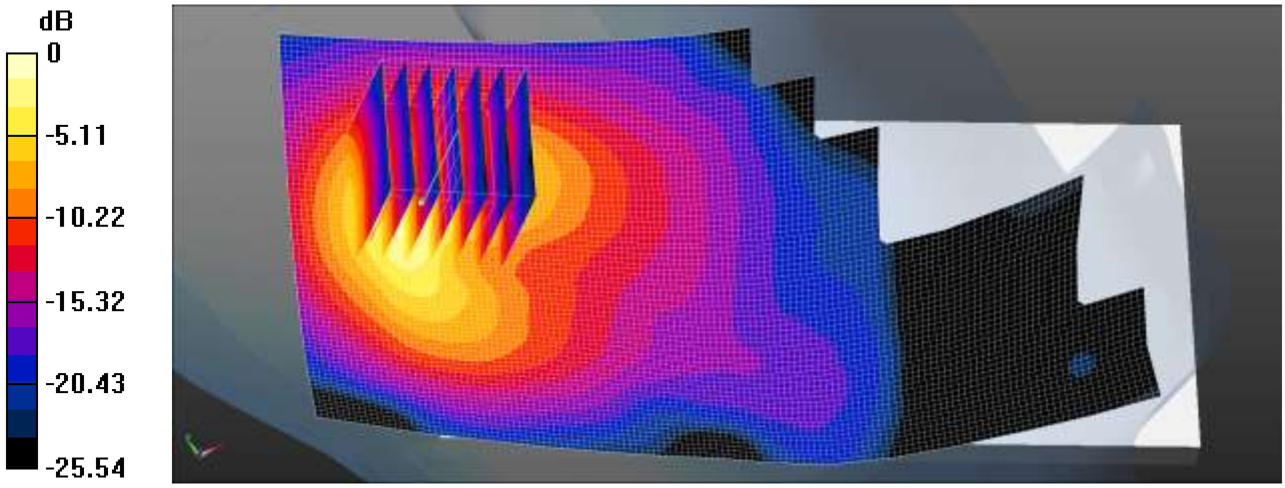
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.809 S/m; ε_r = 39.366; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(4.72, 4.72, 4.72); Calibrated: 2018-07-26;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: SAM with CRP v5.0
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Head Left Tilt 1Mbps 11ch/Area Scan (81x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.428 W/kg

802.11b Head Left Tilt 1Mbps 11ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.849 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.831 W/kg
SAR(1 g) = 0.326 W/kg; SAR(10 g) = 0.134 W/kg
Maximum value of SAR (measured) = 0.450 W/kg



0 dB = 0.450 W/kg = −3.47 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.5 ℃
Test Date: 04/10/2019
Plot No.: 8

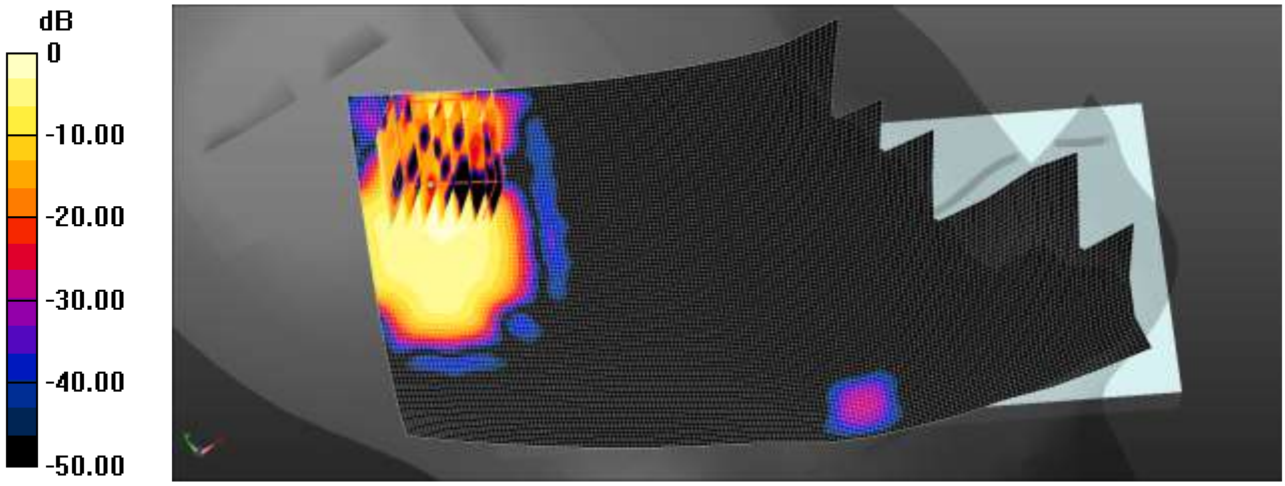
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5825 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 5.155 S/m; ε_r = 36.185; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.8, 4.8, 4.8); Calibrated: 2018-08-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2018-05-25
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

802.11a Head Left Tilt 6Mbps 165ch/Area Scan (101x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.235 W/kg

802.11a Head Left Tilt 6Mbps 165ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm ; Graded Ratio:1.4
Reference Value = 4.305 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.067 W/kg; SAR(10 g) = 0.018 W/kg
Maximum value of SAR (measured) = 0.198 W/kg



0 dB = 0.235 W/kg = -6.30 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	19.9 ℃
Ambient Temperature:	20.2 ℃
Test Date:	04/10/2019
Plot No.:	9

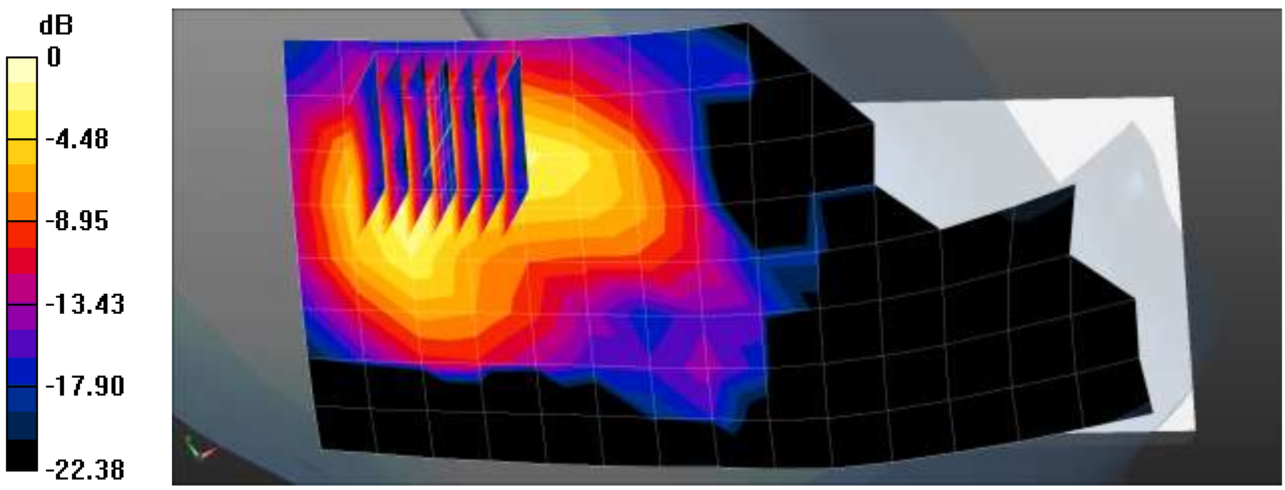
Communication System: UID 0, Bluetooth (0); Frequency: 2402 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.735 S/m; ε_r = 39.615; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(4.72, 4.72, 4.72); Calibrated: 2018-07-26;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: SAM with CRP v5.0
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Head Touch DH5 0ch/Area Scan (9x17x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0477 W/kg

Bluetooth Head Touch DH5 0ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.147 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.104 W/kg
SAR(1 g) = 0.041 W/kg; SAR(10 g) = 0.017 W/kg
Maximum value of SAR (measured) = 0.0554 W/kg



0 dB = 0.0554 W/kg = −12.56 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	10

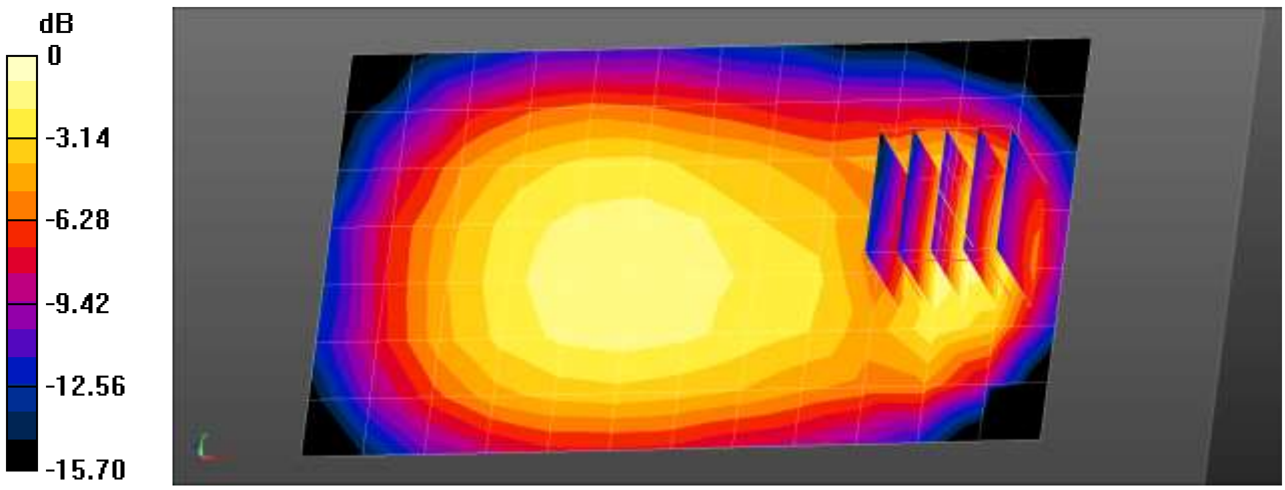
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 56.464; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.4, 9.4, 9.4); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

GSM850 Body Worn Rear Voice 190ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0515 W/kg

GSM850 Body Worn Rear Voice 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.434 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.0810 W/kg
SAR(1 g) = 0.048 W/kg; SAR(10 g) = 0.028 W/kg
Maximum value of SAR (measured) = 0.0691 W/kg



0 dB = 0.0691 W/kg = -11.61 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	11

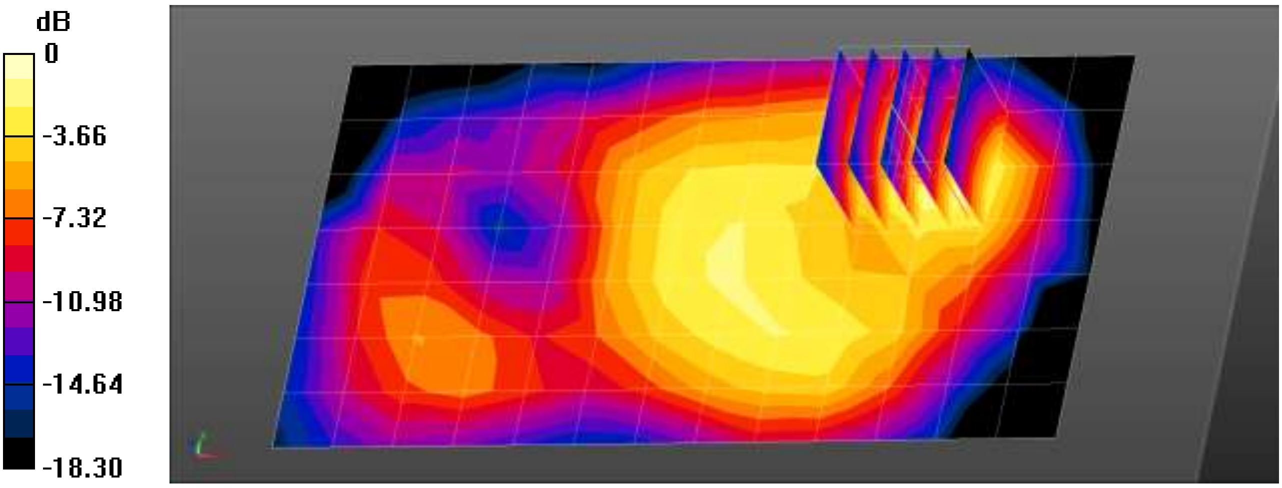
Communication System: UID 10021 - DAC, GSM-FDD (TDMA, GMSK); Frequency: 1880 MHz;Duty Cycle: 1:8.6896
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.614; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(7.64, 7.64, 7.64); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

GSM1900 Body Worn Body Rear 661ch/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0715 W/kg

GSM1900 Body Worn Body Rear 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.294 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.114 W/kg
SAR(1 g) = 0.064 W/kg; SAR(10 g) = 0.033 W/kg
Maximum value of SAR (measured) = 0.0765 W/kg



0 dB = 0.0765 W/kg = -11.16 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	12

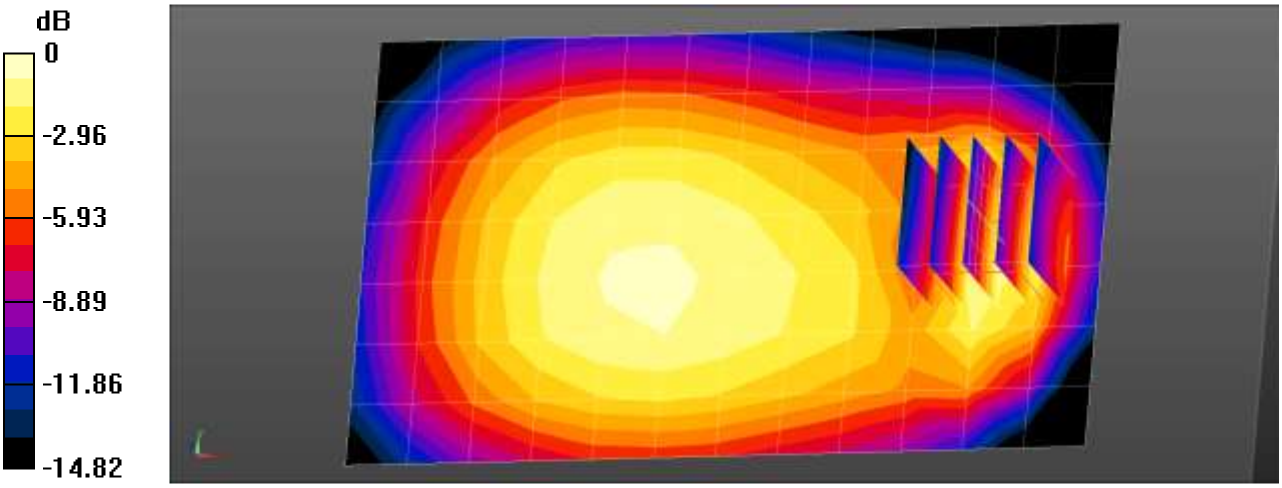
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 56.464; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.4, 9.4, 9.4); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA850 Body Rear 4183ch Body Worn/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0975 W/kg

WCDMA850 Body Rear 4183ch Body Worn/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.21 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.137 W/kg
SAR(1 g) = 0.081 W/kg; SAR(10 g) = 0.047 W/kg
Maximum value of SAR (measured) = 0.116 W/kg



0 dB = 0.116 W/kg = -9.36 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	13

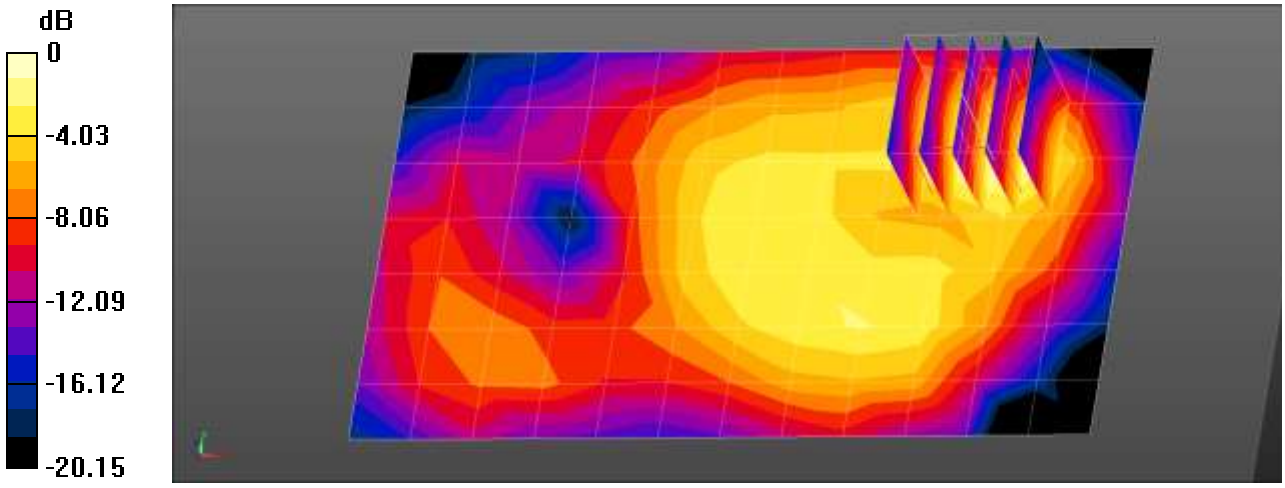
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.614; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(7.64, 7.64, 7.64); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA1900 Body-worn Rear 9400ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.0720 W/kg

WCDMA1900 Body-worn Rear 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.977 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.0930 W/kg
SAR(1 g) = 0.052 W/kg; SAR(10 g) = 0.027 W/kg
Maximum value of SAR (measured) = 0.0788 W/kg



0 dB = 0.0788 W/kg = −11.03 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.5 ℃
Test Date:	04/10/2019
Plot No.:	14

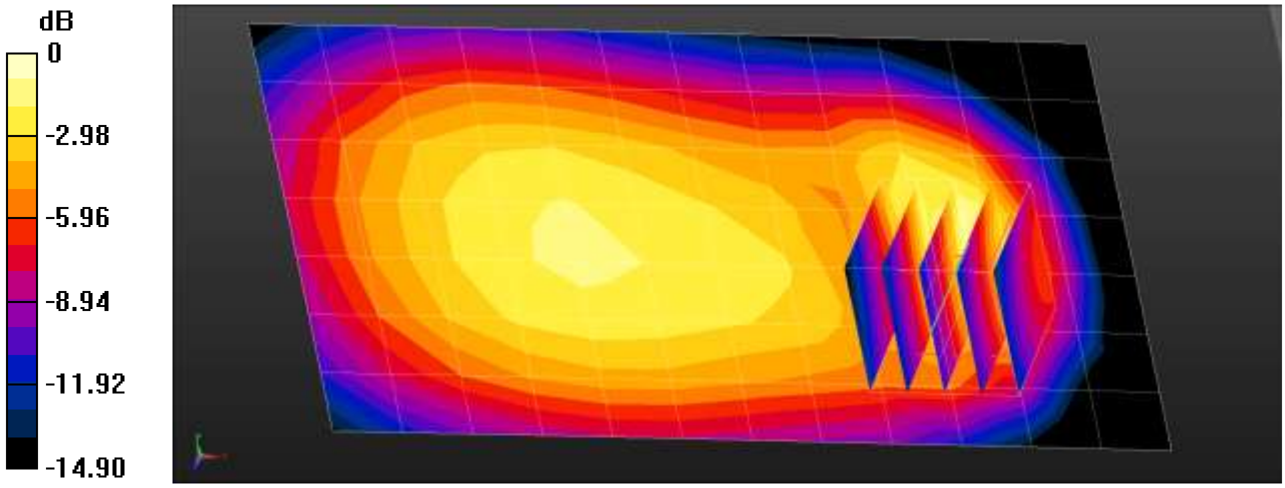
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.957 S/m; ε_r = 56.457; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(10, 10, 10); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

LTE Band 5 Body Rear QPSK 10MHz 1RB 0offset 20525ch Body worn/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.116 W/kg

LTE Band 5 Body Rear QPSK 10MHz 1RB 0offset 20525ch Body worn/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.22 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.177 W/kg
SAR(1 g) = 0.110 W/kg; SAR(10 g) = 0.062 W/kg
Maximum value of SAR (measured) = 0.151 W/kg



0 dB = 0.151 W/kg = -8.21 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	04/08/2019
Plot No.:	15

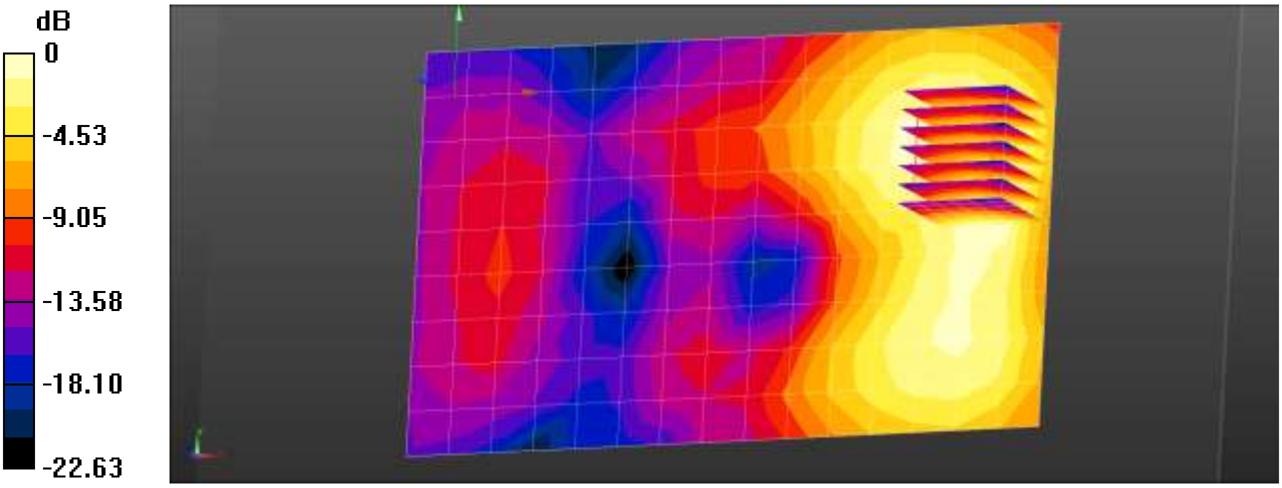
Communication System: UID 0, LTE Band 41 (FCC) (0); Frequency: 2565 MHz;Duty Cycle: 1:1.58052
Medium parameters used (interpolated): f = 2565 MHz; σ = 2.082 S/m; ϵ_r = 53.278; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.05, 7.05, 7.05); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE 41 Body Rear QPSK 20MHz 1RB 49offset 40340ch/Area Scan (16x10x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0842 W/kg

LTE 41 Body Rear QPSK 20MHz 1RB 49offset 40340ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.575 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.132 W/kg
SAR(1 g) = 0.070 W/kg; SAR(10 g) = 0.036 W/kg
Maximum value of SAR (measured) = 0.107 W/kg



0 dB = 0.0842 W/kg = -10.75 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	20.6℃
Ambient Temperature:	20.8℃
Test Date:	04/08/2019
Plot No.:	16

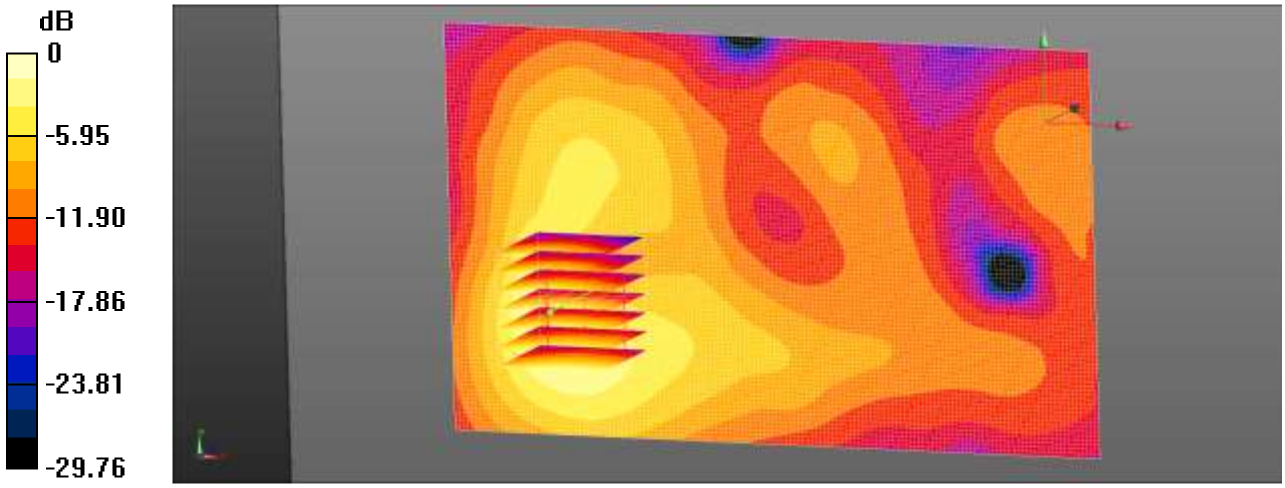
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.958 S/m; ε_r = 53.581; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.13, 7.13, 7.13); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Body Rear 1Mbps 11ch/Area Scan (151x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.130 W/kg

802.11b Body Rear 1Mbps 11ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.820 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.165 W/kg
SAR(1 g) = 0.086 W/kg; SAR(10 g) = 0.043 W/kg
Maximum value of SAR (measured) = 0.133 W/kg



0 dB = 0.133 W/kg = -8.76 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.5 ℃
Test Date:	04/10/2019
Plot No.:	17

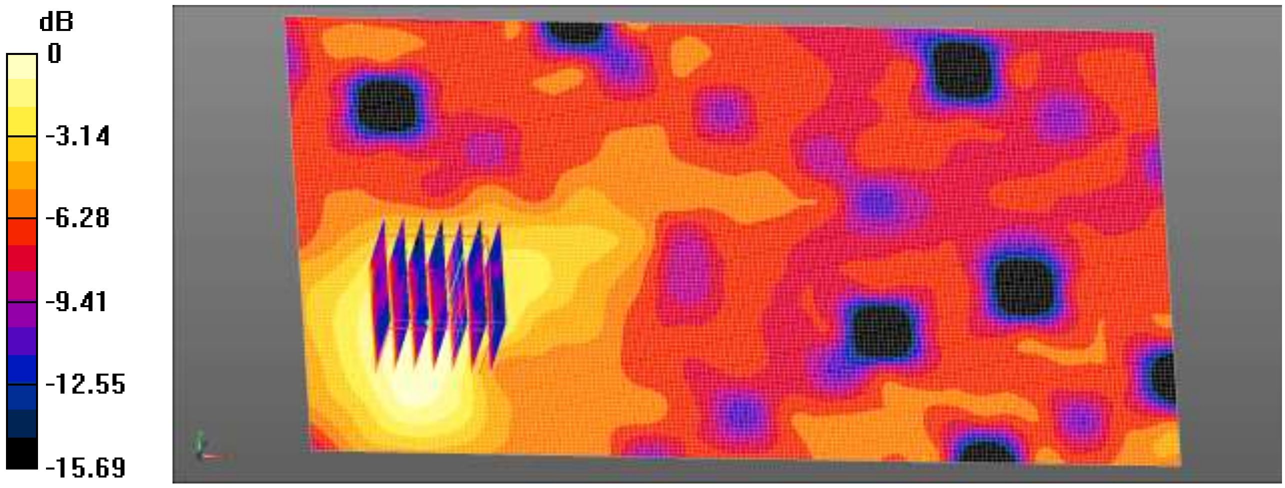
Communication System: UID 0, WIFI 5GHz UNII3 (0); Frequency: 5825 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 6.128 S/m; ε_r = 46.12; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(4.36, 4.36, 4.36); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

802.11a Body Worn Rear 6Mbps 165ch/Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0811 W/kg

802.11a Body Worn Rear 6Mbps 165ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm ; Graded Ratio:1.4
Reference Value = 1.325 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.216 W/kg
SAR(1 g) = 0.041 W/kg; SAR(10 g) = 0.021 W/kg
Maximum value of SAR (measured) = 0.0817 W/kg



0 dB = 0.0817 W/kg = -10.88 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	04/08/2019
Plot No.:	18

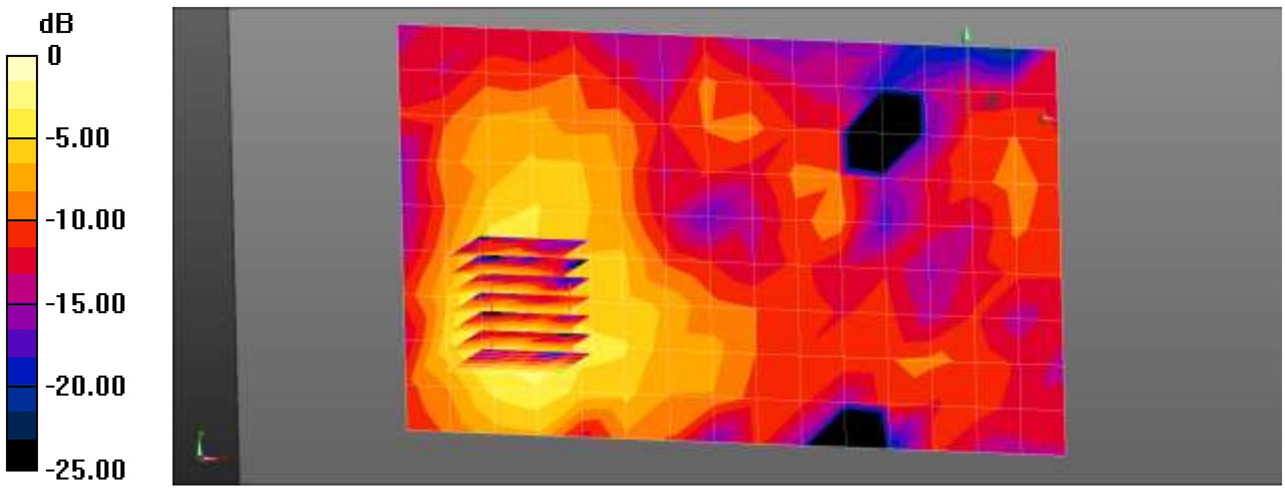
Communication System: UID 0, Bluetooth (0); Frequency: 2402 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.888 S/m; ε_r = 53.795; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.13, 7.13, 7.13); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Body Rear DH5 0ch/Area Scan (16x10x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0193 W/kg

Bluetooth Body Rear DH5 0ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.8760 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.0280 W/kg
SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00767 W/kg
Maximum value of SAR (measured) = 0.0226 W/kg



0 dB = 0.0226 W/kg = −16.46 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	19

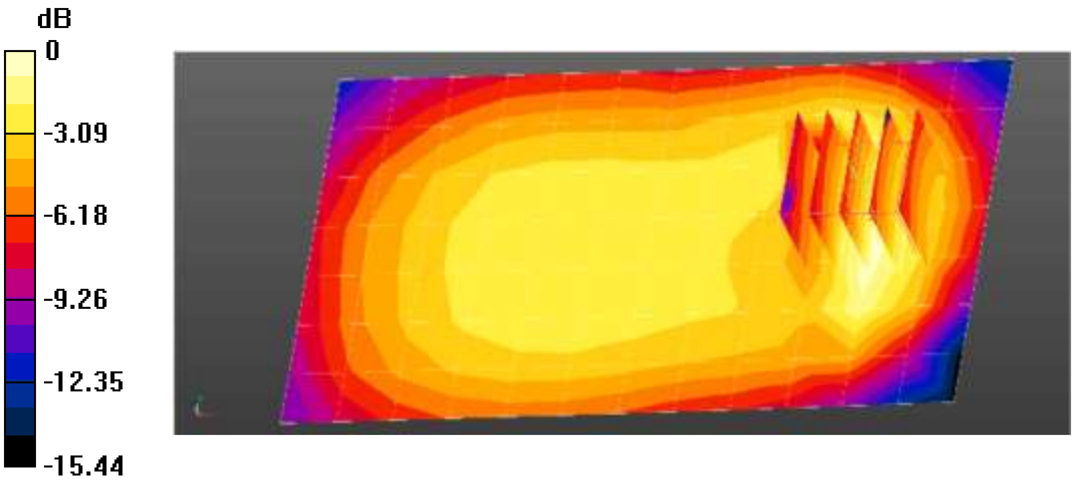
Communication System: UID 0, GSM850 GPRS 4TX (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07491
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 56.464; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.4, 9.4, 9.4); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

GSM850 Body Rear 4Tx 190ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.314 W/kg

GSM850 Body Rear 4Tx 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.98 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.545 W/kg
SAR(1 g) = 0.286 W/kg; SAR(10 g) = 0.145 W/kg
Maximum value of SAR (measured) = 0.419 W/kg



0 dB = 0.419 W/kg = −3.78 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	22.6 ℃
Ambient Temperature:	22.8 ℃
Test Date:	04/09/2019
Plot No.:	20

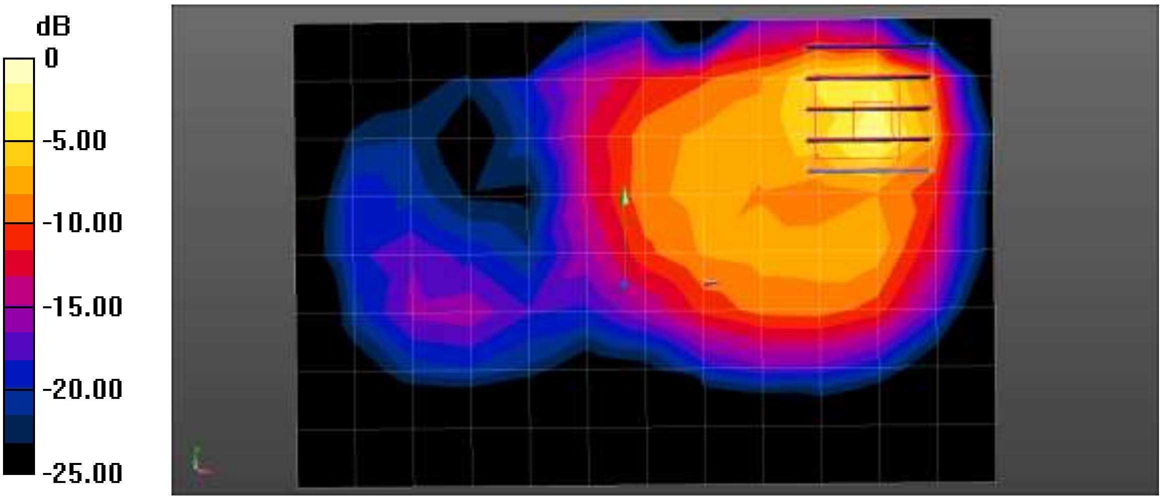
Communication System: UID 0, GSM 1900 4TX (0); Frequency: 1880 MHz;Duty Cycle: 1:2.07491
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.614; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(7.64, 7.64, 7.64); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

GSM1900 Body Rear 4Tx 661ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.296 W/kg

GSM1900 Body Rear 4Tx 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.107 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.360 W/kg
SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.095 W/kg
Maximum value of SAR (measured) = 0.317 W/kg



0 dB = 0.317 W/kg = -4.99 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 22.6 ℃
Ambient Temperature: 22.8 ℃
Test Date: 04/09/2019
Plot No.: 21

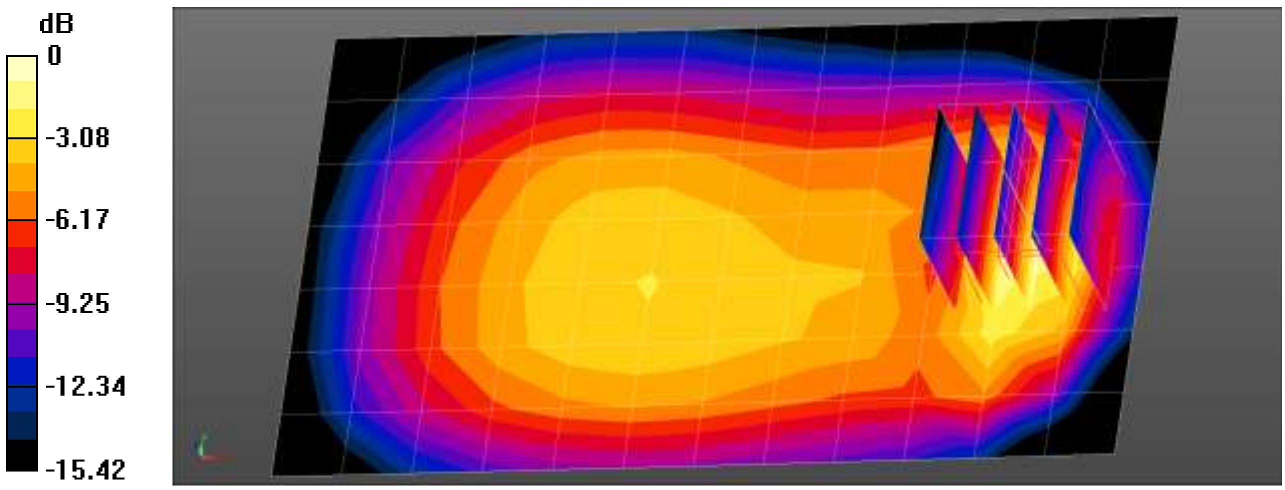
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.963 S/m; ε_r = 56.464; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.4, 9.4, 9.4); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA850 Body Rear 4183ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.165 W/kg

WCDMA850 Body Rear 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.75 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.153 W/kg; SAR(10 g) = 0.084 W/kg
Maximum value of SAR (measured) = 0.230 W/kg



0 dB = 0.230 W/kg = -6.38 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 22.6 ℃
Ambient Temperature: 22.8 ℃
Test Date: 04/09/2019
Plot No.: 22

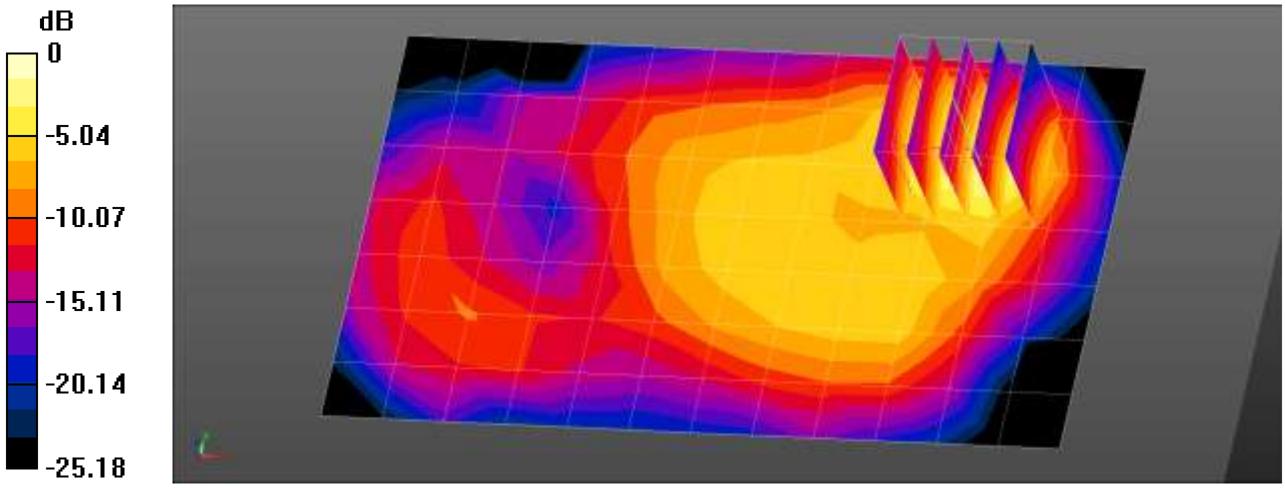
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.614; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(7.64, 7.64, 7.64); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA1900 Body Rear 9400ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.191 W/kg

WCDMA1900 Body Rear 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.167 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.288 W/kg
SAR(1 g) = 0.145 W/kg; SAR(10 g) = 0.072 W/kg
Maximum value of SAR (measured) = 0.236 W/kg



0 dB = 0.236 W/kg = -6.27 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.5 ℃
Test Date:	04/10/2019
Plot No.:	23

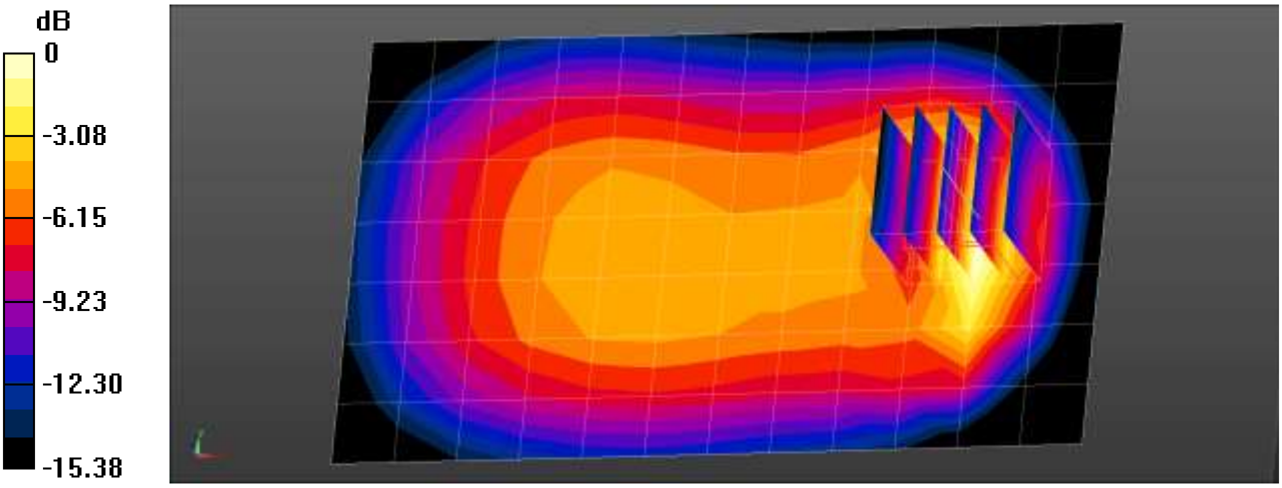
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.957 S/m; ε_r = 56.457; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(10, 10, 10); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

LTE Band 5 Body Rear QPSK 10MHz 1RB 0offset 20525ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.319 W/kg

LTE Band 5 Body Rear QPSK 10MHz 1RB 0offset 20525ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.35 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.122 W/kg
Maximum value of SAR (measured) = 0.334 W/kg



0 dB = 0.334 W/kg = -4.76 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	04/08/2019
Plot No.:	24

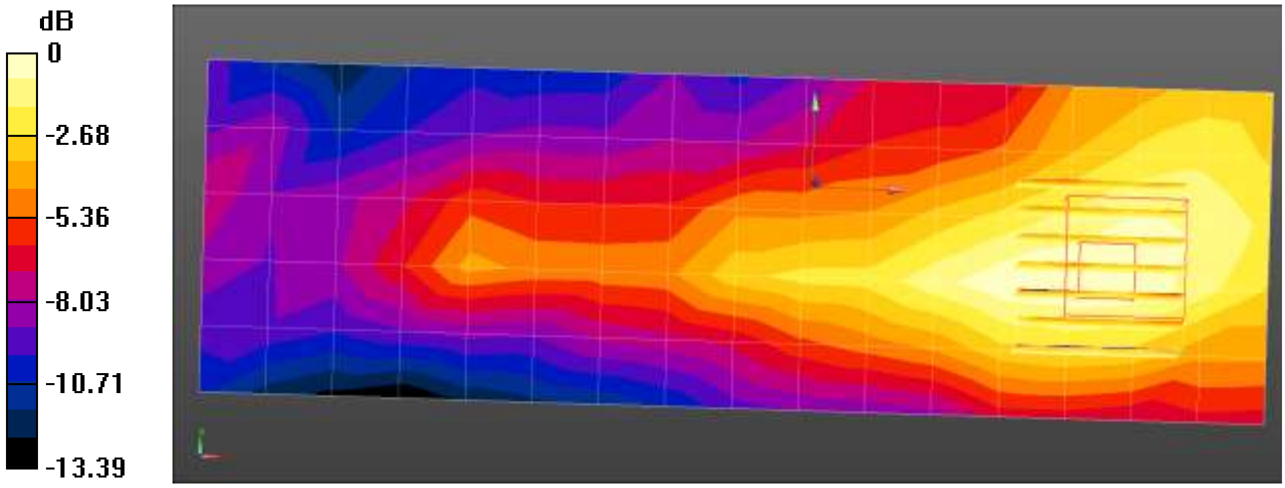
Communication System: UID 0, LTE Band 41 (FCC) (0); Frequency: 2565 MHz;Duty Cycle: 1:1.58052
Medium parameters used (interpolated): f = 2565 MHz; σ = 2.082 S/m; ε_r = 53.278; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.05, 7.05, 7.05); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE 41 Body Right QPSK 20MHz 1RB 49offset 40340ch/Area Scan (17x6x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0246 W/kg

LTE 41 Body Right QPSK 20MHz 1RB 49offset 40340ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.673 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.0310 W/kg
SAR(1 g) = 0.017 W/kg; SAR(10 g) = 0.00943 W/kg
Maximum value of SAR (measured) = 0.0250 W/kg



0 dB = 0.0246 W/kg = −16.09 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.6 ℃
Ambient Temperature: 20.8 ℃
Test Date: 04/08/2019
Plot No.: 25

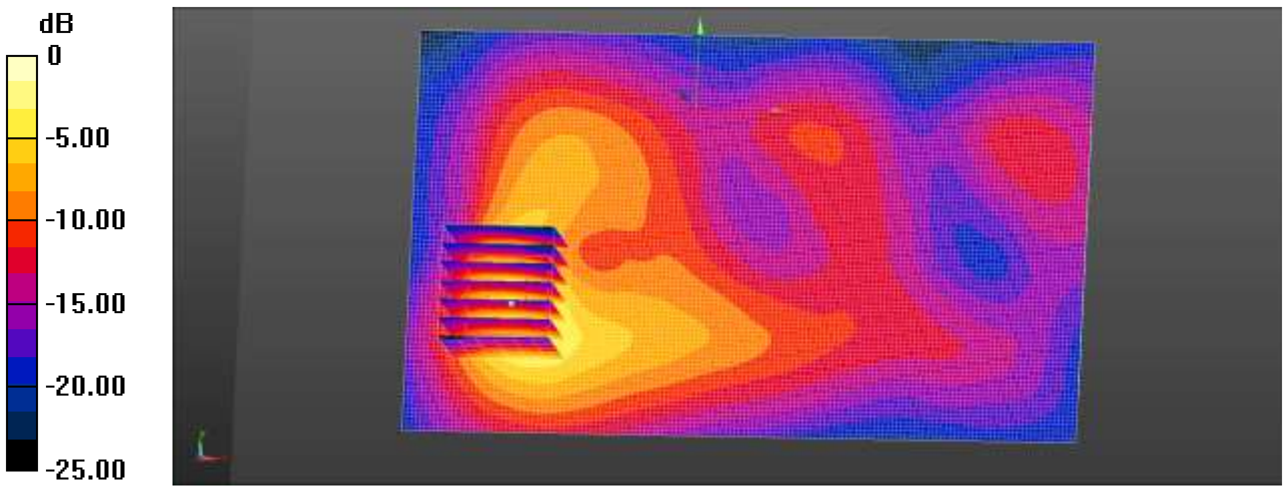
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.958 S/m; ε_r = 53.581; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.13, 7.13, 7.13); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Body Rear 1Mbps 11ch/Area Scan (151x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.391 W/kg

802.11b Body Rear 1Mbps 11ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.674 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.494 W/kg
SAR(1 g) = 0.230 W/kg; SAR(10 g) = 0.099 W/kg
Maximum value of SAR (measured) = 0.382 W/kg



0 dB = 0.382 W/kg = -4.18 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	21.2 ℃
Ambient Temperature:	21.5 ℃
Test Date:	04/10/2019
Plot No.:	26

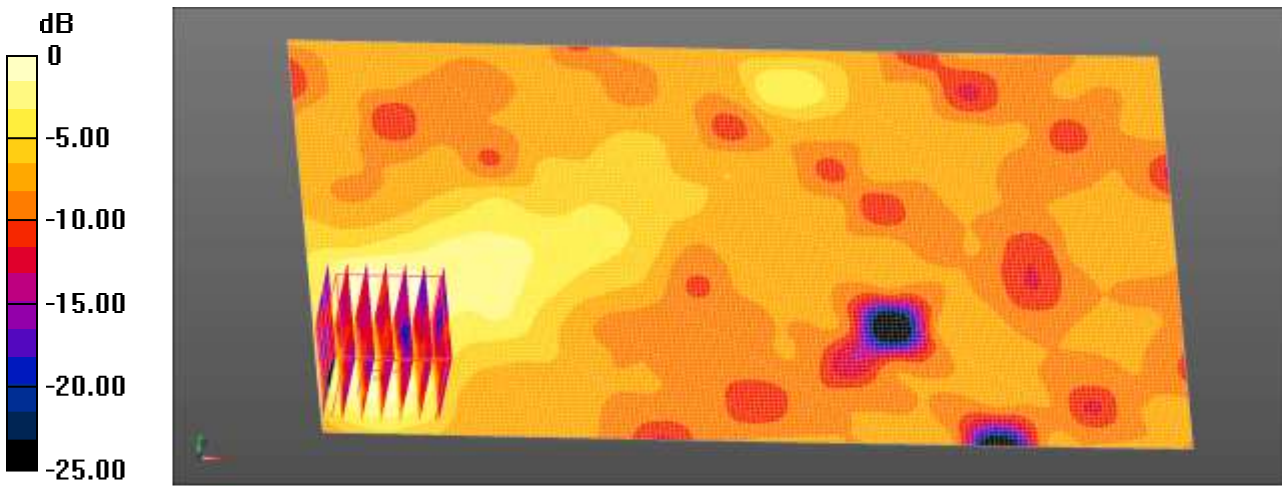
Communication System: UID 0, WIFI 5GHz UNII3 (0); Frequency: 5825 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 6.128 S/m; ε_r = 46.12; ρ = 1000 kg/m³
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(4.36, 4.36, 4.36); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

802.11a Body Rear 6Mbps 165ch/Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.112 W/kg

802.11a Body Rear 6Mbps 165ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm ; Graded Ratio:1.4
Reference Value = 1.034 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.056 W/kg; SAR(10 g) = 0.022 W/kg
Maximum value of SAR (measured) = 0.120 W/kg



0 dB = 0.120 W/kg = -9.21 dBW/kg

Test Laboratory:	HCT CO., LTD
EUT Type:	Mobile Phone
Liquid Temperature:	20.6 ℃
Ambient Temperature:	20.8 ℃
Test Date:	04/08/2019
Plot No.:	27

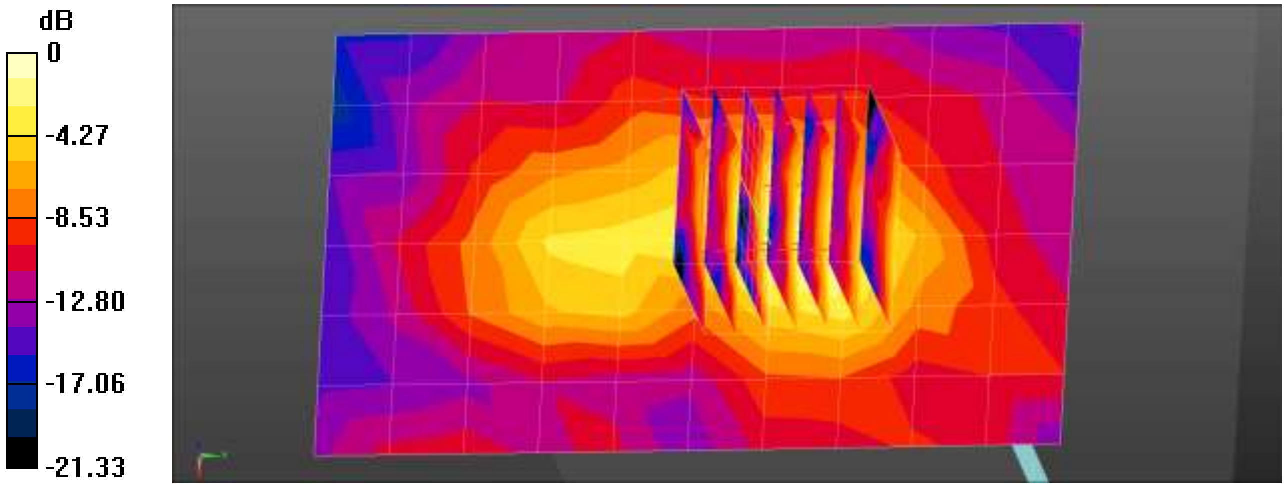
Communication System: UID 0, Bluetooth (0); Frequency: 2402 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.888 S/m; ε_r = 53.795; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.13, 7.13, 7.13); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Body Top DH5 0ch/Area Scan (7x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0249 W/kg

Bluetooth Body Top DH5 0ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.002 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.0320 W/kg
SAR(1 g) = 0.017 W/kg; SAR(10 g) = 0.0079 W/kg
Maximum value of SAR (measured) = 0.0244 W/kg



0 dB = 0.0244 W/kg = -16.13 dBW/kg

Attachment 2. – Dipole Verification Plots

■ Verification Data (835 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	22.6 ℃
Test Date:	04/09/2019

DUT: Dipole 835 MHz D835V2; Type: D835V2

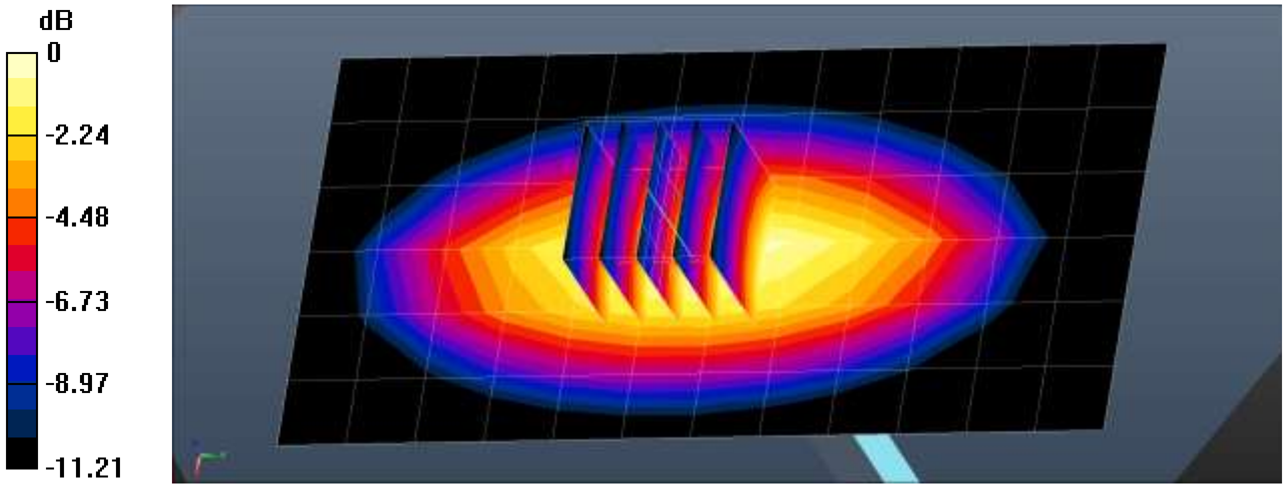
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.912 S/m; ε_r = 40.39; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.54, 9.54, 9.54); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.606 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.11 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.721 W/kg
SAR(1 g) = 0.472 W/kg; SAR(10 g) = 0.305 W/kg
Maximum value of SAR (measured) = 0.638 W/kg



0 dB = 0.638 W/kg = -1.95 dBW/kg

■ Verification Data (835 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	22.6 ℃
Test Date:	04/09/2019

DUT: Dipole 835 MHz D835V2; Type: D835V2

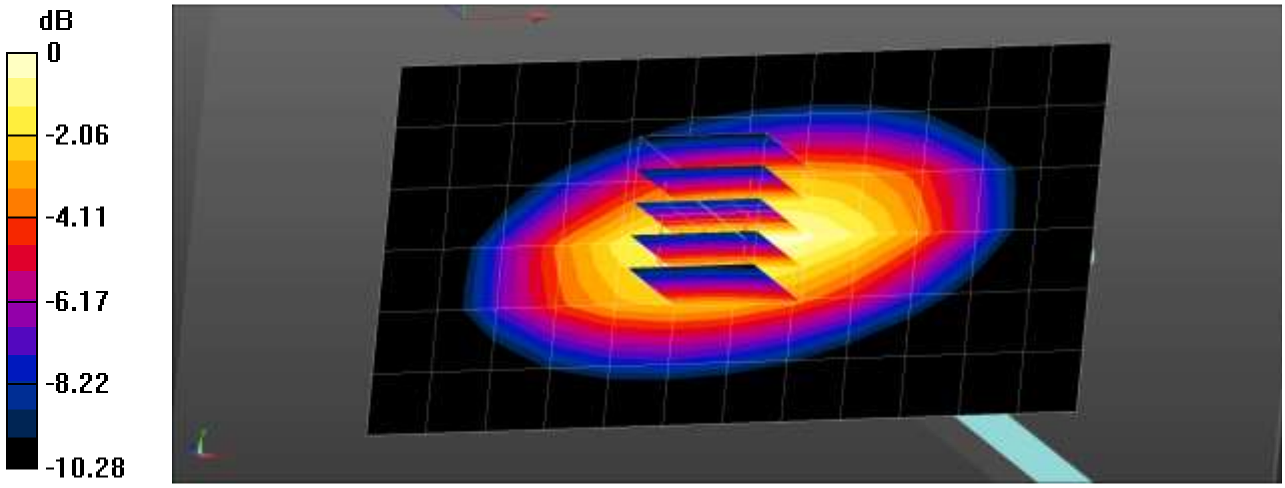
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.961 S/m; ε_r = 56.49; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(9.4, 9.4, 9.4); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Body Verification/Area Scan (13x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.610 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.35 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.690 W/kg
SAR(1 g) = 0.465 W/kg; SAR(10 g) = 0.309 W/kg
Maximum value of SAR (measured) = 0.616 W/kg



0 dB = 0.616 W/kg = -2.10 dBW/kg

■ Verification Data (835 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.2 ℃
Test Date:	04/10/2019

DUT: Dipole 835 MHz D835V2; Type: D835V2

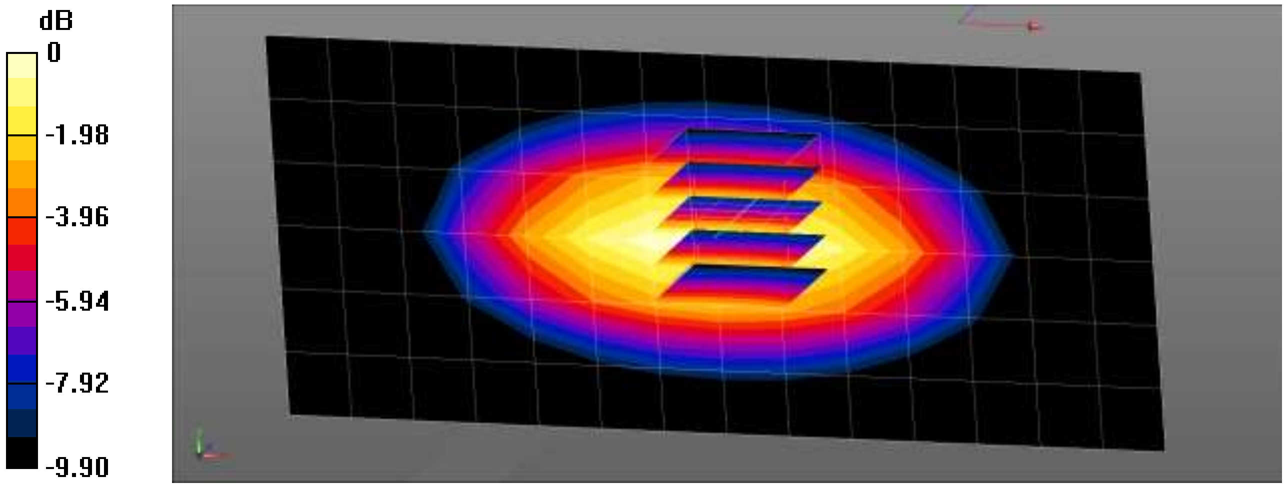
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.956 S/m; ε_r = 56.47; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(10, 10, 10); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/835MHz Body Verification/Area Scan (7x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.519 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.19 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.455 W/kg; SAR(10 g) = 0.296 W/kg
Maximum value of SAR (measured) = 0.506 W/kg



0 dB = 0.506 W/kg = -2.96 dBW/kg

■ Verification Data (1 900 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	22.6 ℃
Test Date:	04/09/2019

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

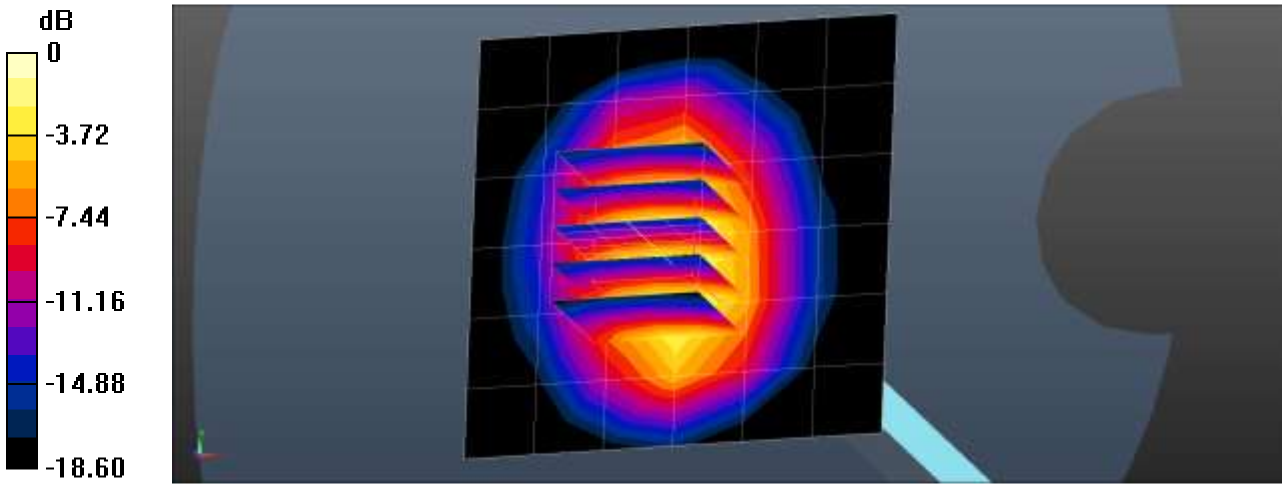
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.397 S/m; ε_r = 38.757; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(8.12, 8.12, 8.12); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1 900 MHz Head Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.50 W/kg

Dipole/1 900 MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 42.33 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.88 W/kg
SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.07 W/kg
Maximum value of SAR (measured) = 2.62 W/kg



0 dB = 2.62 W/kg = 4.18 dBW/kg

■ Verification Data (1 900 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	22.6 ℃
Test Date:	04/09/2019

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

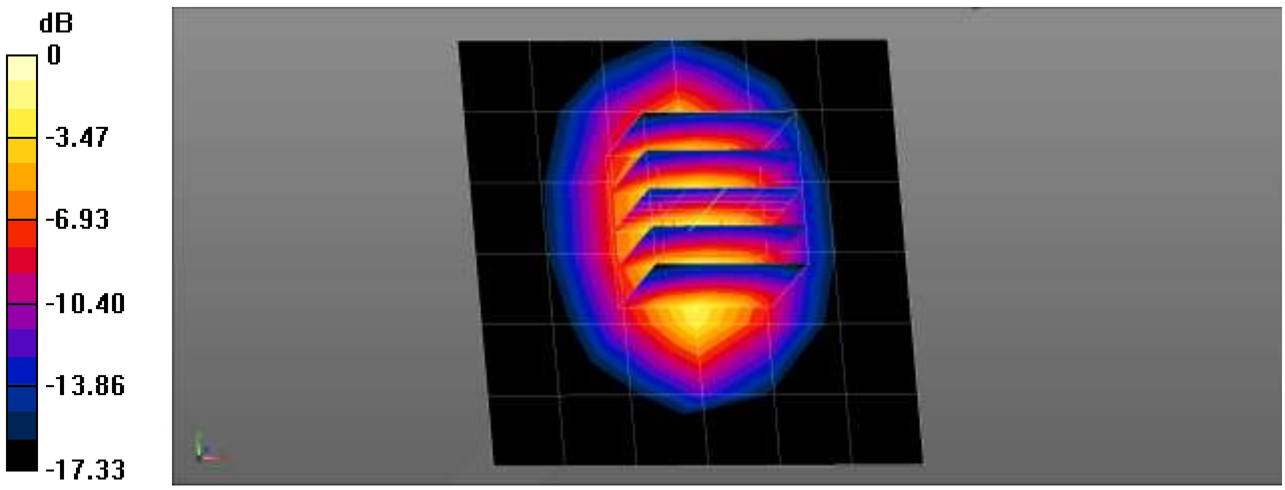
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.522 S/m; ε_r = 53.535; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3967; ConvF(7.64, 7.64, 7.64); Calibrated: 2019-02-01;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2019-01-25
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.26 W/kg

Dipole/1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 38.76 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.28 W/kg
SAR(1 g) = 1.82 W/kg; SAR(10 g) = 0.949 W/kg
Maximum value of SAR (measured) = 2.31 W/kg



0 dB = 2.31 W/kg = 3.64 dBW/kg

■ Verification Data (2 450 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	19.9 ℃
Test Date:	04/10/2019

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

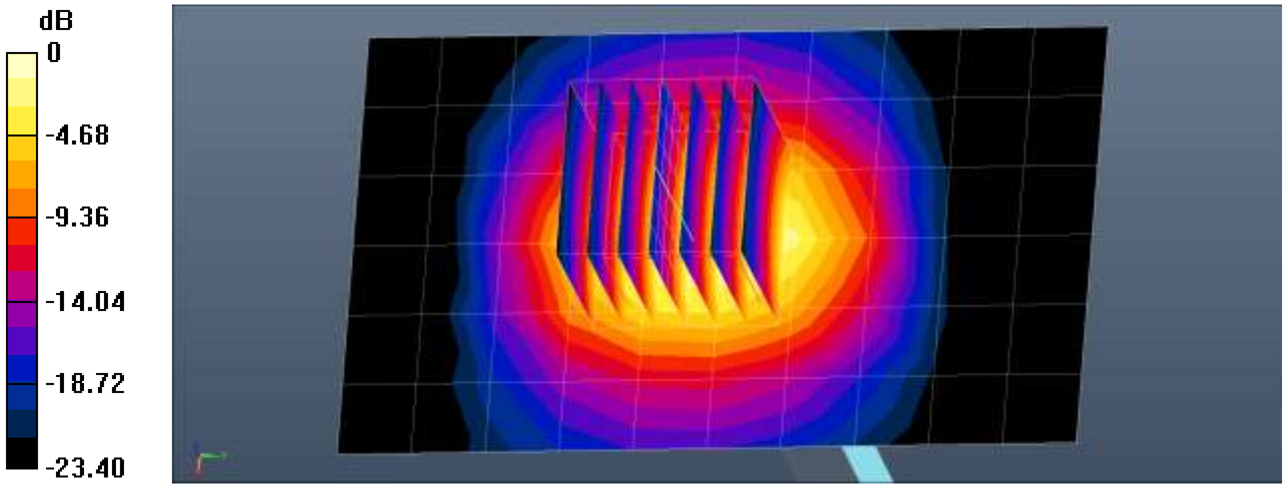
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.796 S/m; ε_r = 39.38; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(4.72, 4.72, 4.72); Calibrated: 2018-07-26;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: SAM with CRP v5.0
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Head Verification/Area Scan (7x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.21 W/kg

Dipole/2450MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 44.53 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 5.39 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.14 W/kg
Maximum value of SAR (measured) = 3.33 W/kg



0 dB = 3.33 W/kg = 5.22 dBW/kg

■ Verification Data (2 450 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.6 ℃
Test Date:	04/08/2019

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

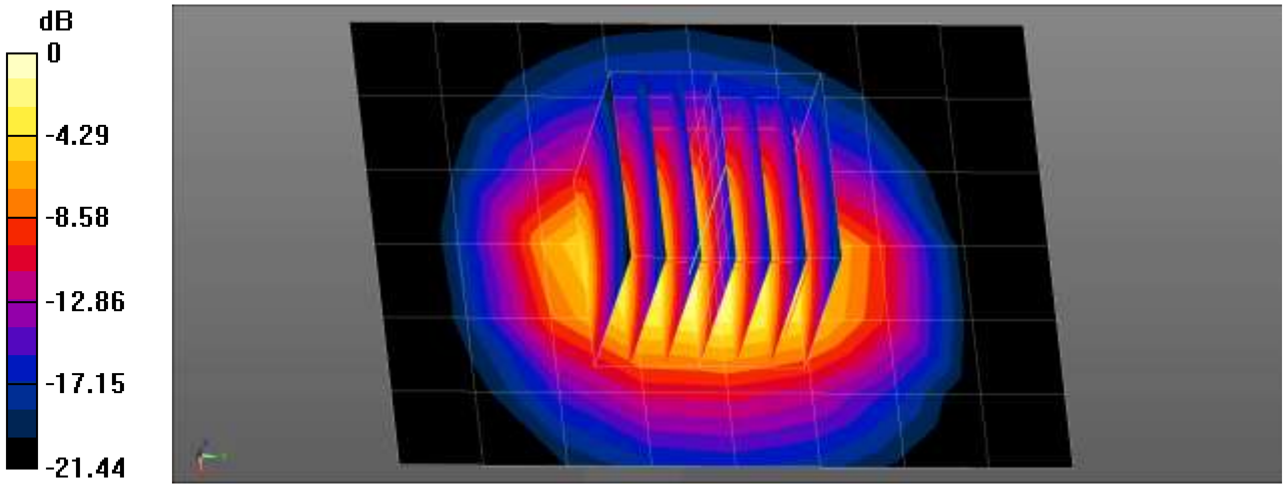
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.946 S/m; ε_r = 53.631; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.13, 7.13, 7.13); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Body Verification/Area Scan (7x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.03 W/kg

Dipole/2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.43 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 4.55 W/kg
SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.1 W/kg
Maximum value of SAR (measured) = 3.67 W/kg



0 dB = 3.67 W/kg = 5.65 dBW/kg

■ Verification Data (2 600 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	19.9 ℃
Test Date:	04/10/2019

DUT: Dipole 2600 MHz D2600V2; Type: D2600V2

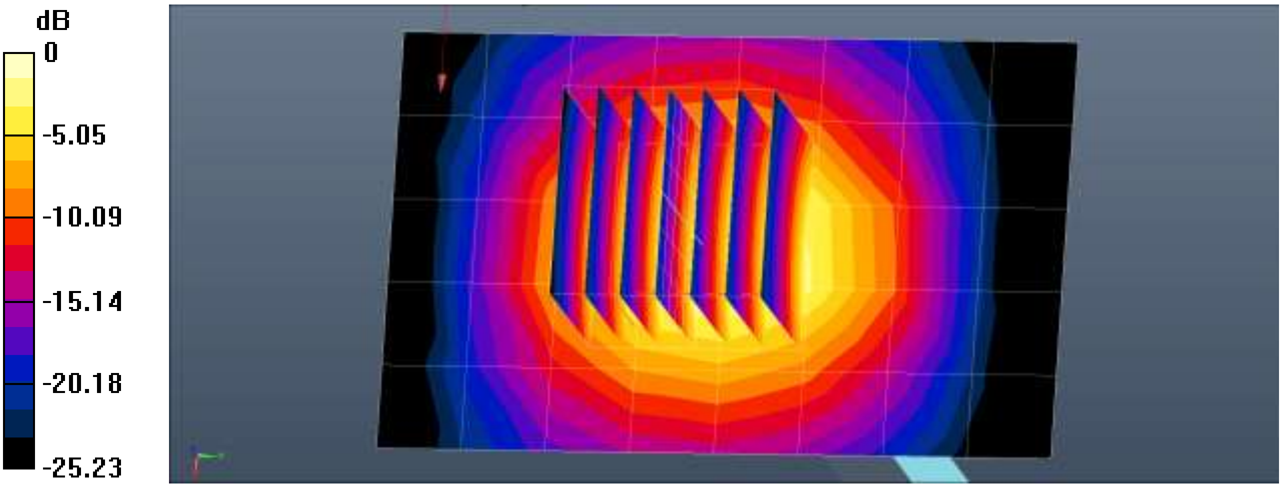
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.944 S/m; ε_r = 38.793; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(4.57, 4.57, 4.57); Calibrated: 2018-07-26;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn466; Calibrated: 2018-08-22
- Phantom: SAM with CRP v5.0
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2600MHz Head Verification/Area Scan (6x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.16 W/kg

Dipole/2600MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.12 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 6.58 W/kg
SAR(1 g) = 2.9 W/kg; SAR(10 g) = 1.29 W/kg
Maximum value of SAR (measured) = 3.85 W/kg



0 dB = 3.85 W/kg = 5.85 dBW/kg

■ Verification Data (2 600 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.6 ℃
Test Date:	04/08/2019

DUT: Dipole 2600 MHz D2600V2; Type: D2600V2

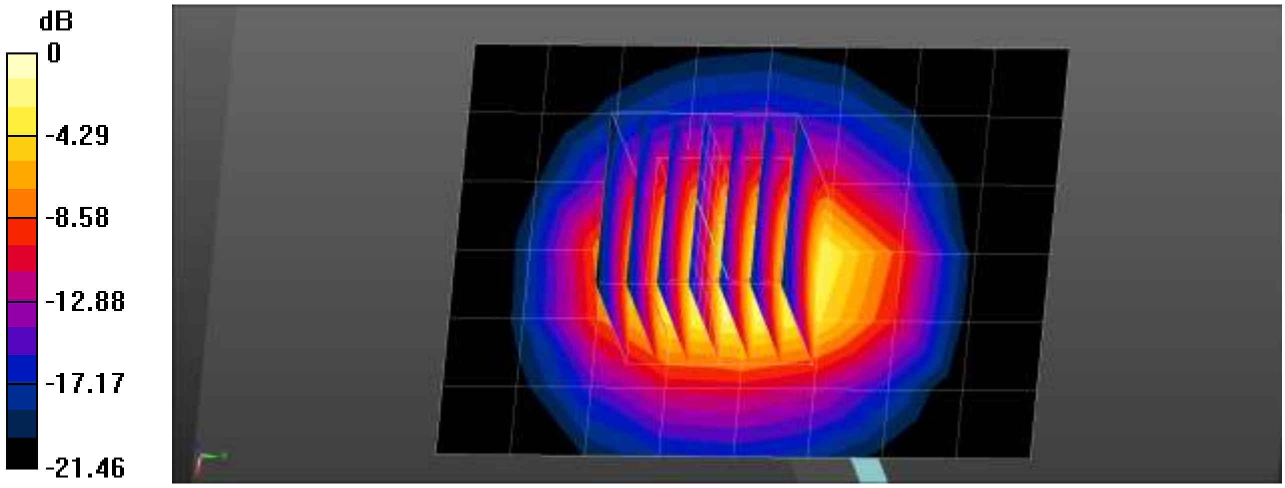
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.112 S/m; ε_r = 53.115; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.05, 7.05, 7.05); Calibrated: 2018-11-22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2018-11-16
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2600MHz Body Verification/Area Scan (7x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.35 W/kg

Dipole/2600MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 41.66 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 5.03 W/kg
SAR(1 g) = 2.59 W/kg; SAR(10 g) = 1.21 W/kg
Maximum value of SAR (measured) = 4.06 W/kg



0 dB = 4.06 W/kg = 6.09 dBW/kg

■ Verification Data (5 750 MHz Head)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.2 ℃
Test Date:	04/10/2019

DUT: Dipole D5GHzV2; Type: D5GHzV2

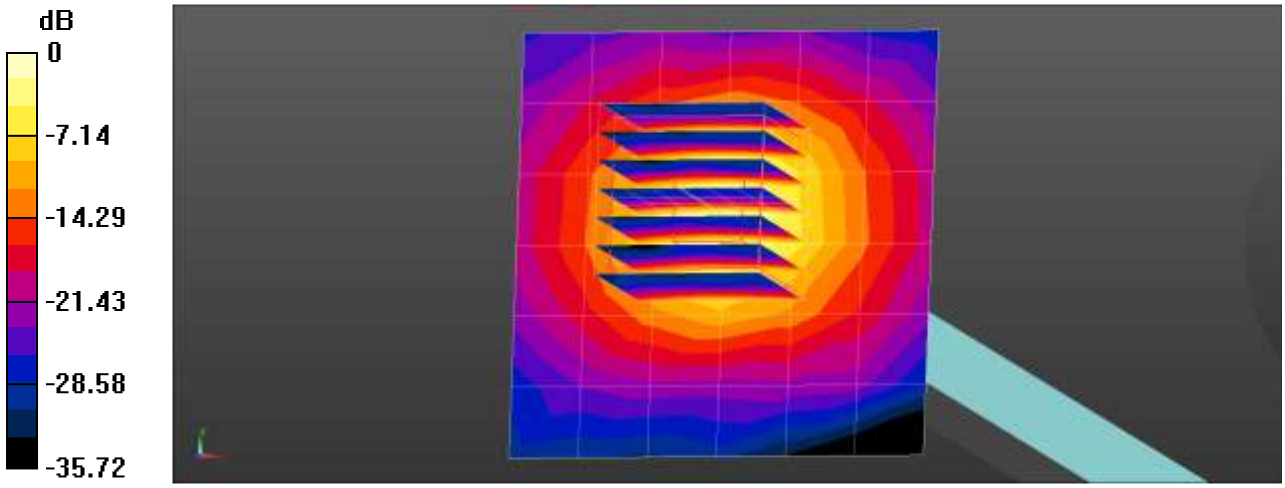
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.218 S/m; ε_r = 35.657; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.8, 4.8, 4.8); Calibrated: 2018-08-30;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2018-05-25
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5750MHz Head Verification/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 9.42 W/kg

Dipole/5750MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm ; Graded Ratio:1.4
Reference Value = 47.16 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 22.7 W/kg
SAR(1 g) = 4.03 W/kg; SAR(10 g) = 1.08 W/kg
Maximum value of SAR (measured) = 11.2 W/kg



0 dB = 11.2 W/kg = 10.49 dBW/kg

■ Verification Data (5 750 MHz Body)

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.2 ℃
Test Date:	04/10/2019

DUT: Dipole D5GHzV2; Type: D5GHzV2

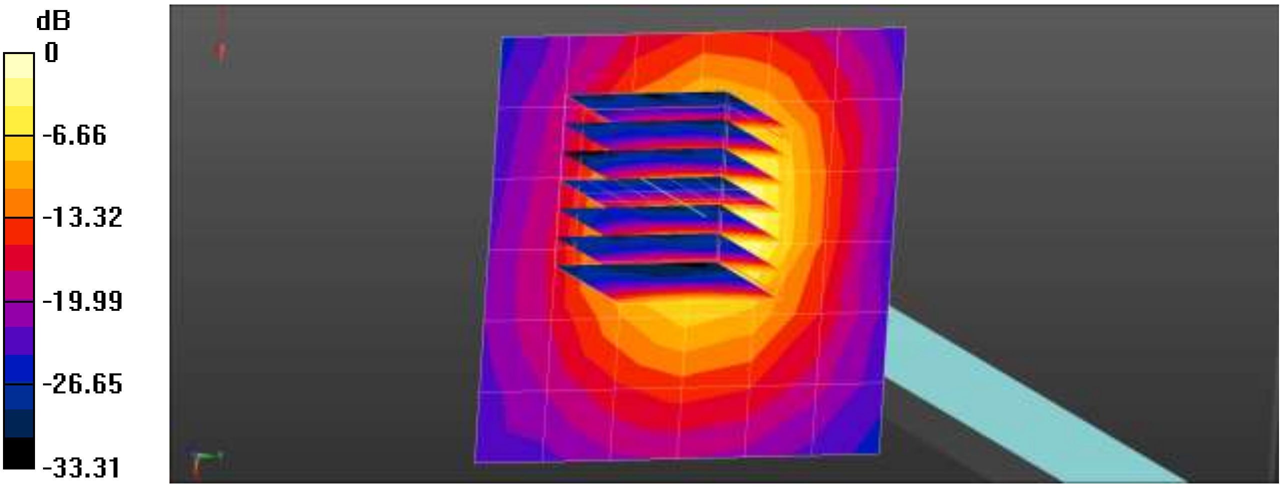
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 6.054 S/m; ε_r = 46.256; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3903; ConvF(4.36, 4.36, 4.36); Calibrated: 2018-09-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2018-09-19
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5750MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.81 W/kg

Dipole/5750MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm ; Graded Ratio:1.4
Reference Value = 38.93 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 3.71 W/kg; SAR(10 g) = 1.1 W/kg
Maximum value of SAR (measured) = 9.00 W/kg



0 dB = 9.00 W/kg = 9.54 dBW/kg

Attachment 3. – SAR Tissue Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Harts grove.

Ingredients	Frequency (MHz)							
(% by weight)	835		1 900		2 450 – 2 700		5 200 - 5 800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body
Water	40.45	53.06	54.9	70.17	71.88	73.2	65.52	78.66
Salt (NaCl)	1.45	0.94	0.18	0.39	0.16	0.1	0.0	0.0
Sugar	57.0	44.9	0.0	0	0.0	0.0	0.0	0.0
HEC	1.0	1.0	0.0	0	0.0	0.0	0.0	0.0
Bactericide	0.1	0.1	0.0	0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	19.97	0.0	17.24	10.67
DGBE	0.0	0.0	44.92	29.44	7.99	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	-	-

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra-pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Composition of the Tissue Equivalent Matter

Attachment 4. – SAR SYSTEM VALIDATION

Per FCC KCB 865664 D02v01r02, SAR system validation status should be document to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in IEEE 1528-2013 and FCC KDB 865664 D01v01r04. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.
A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
8	3967	EX3DV4	Head	835	4d165	2019-02-12	41.7	0.91	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Head	835	4d165	2019-02-12	41.7	0.91	PASS	PASS	PASS	GMSK	PASS	N/A
8	3967	EX3DV4	Body	835	4d165	2019-02-11	55.4	0.97	PASS	PASS	PASS	GMSK	PASS	N/A
5	3903	EX3DV4	Body	835	4d165	2018-10-03	55.4	0.98	PASS	PASS	PASS	N/A	N/A	N/A
8	3967	EX3DV4	Head	1900	5d032	2019-03-04	40.1	1.42	PASS	PASS	PASS	GMSK	PASS	N/A
8	3967	EX3DV4	Body	1900	5d032	2019-03-04	53.3	1.53	PASS	PASS	PASS	GMSK	PASS	N/A
11	3076	ES3DV3	Head	2450	743	2019-02-12	39.4	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
3	3797	EX3DV4	Body	2450	743	2019-02-11	52.8	1.94	PASS	PASS	PASS	OFDM	N/A	PASS
11	3076	ES3DV3	Head	2600	1015	2018-12-03	39.2	1.96	PASS	PASS	PASS	TDD	PASS	NA
3	3797	EX3DV4	Body	2600	1015	2018-12-04	52.3	2.17	PASS	PASS	PASS	TDD	PASS	N/A
12	7370	EX3DV4	Head	5750	1253	2018-12-03	35.8	5.25	PASS	PASS	PASS	OFDM	N/A	PASS
5	3903	EX3DV4	Body	5750	1253	2018-12-03	48.4	5.95	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary 1g

Note;
All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r04.

Attachment 5. – The Verification of Power reduction

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations. The verification process was divided into two parts:
1). Evaluation of output power levels for individual triggering mechanism
2) Evaluation of the triggering distances for proximity-based sensors.

1. Power Reduction Verification for Main Antenna

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. The hotspot power reduction applied to this product has a higher priority than the proximity sensor, so these two conditions do not work simultaneously. and In both cases, powers were reduced to the same Power level.

All Hotspot SAR evaluations for this device were performed at the maximum allowed output Power when Hotspot is activated. FCC KDB Publication 616217D04v01r02 section 6 was used as a guideline for selection SAR test distances for this device when being used in phablet use conditions.

For detailed measurement conducted power results, please refer to the Section .9

1.1. Power Verification Procedure for Main Ant

1. The Power verification was performed according to the following procedure:
2. A base station simulator was used to establish a conducted RF connection and output power was monitored. The Power measurements were conformed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
3. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
4. Step 1 and 2 were repeated for all individual power reduction mechanism and combinations thereof. For the combination cases, one mechanism was switched to a "triggered" state at a time; powers were conformed to be within tolerance after each additional mechanism was activated.

Power Reduction Verification for Main Bands

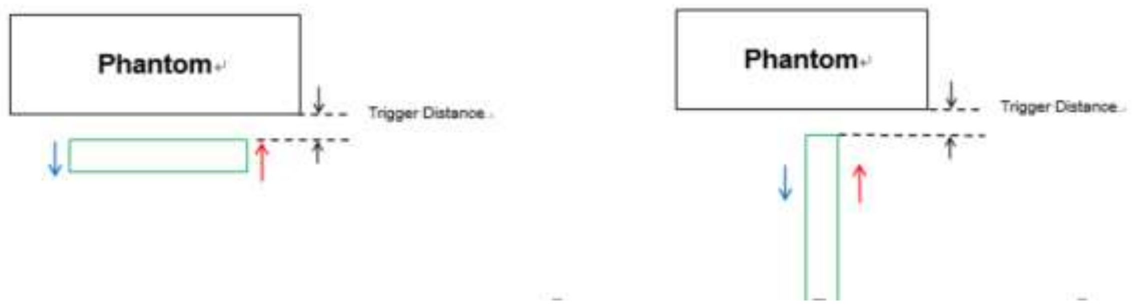
Mechanism(s)	Mode/Band	Conducted Power (dBm)		
		Un-triggered (Max Power)	Triggered (Reduced Power)	Triggered (Reduced Power)
Hotspot On	WCDMA 5	23.69	21.06	
Hotspot On	WCDMA 2	23.67	19.13	
Grip	WCDMA 2	23.67	19.15	
Hotspot On, Then Grip	WCDMA 5	23.69	21.06	21.06
Hotspot On, Then Grip	WCDMA 2	23.67	19.13	19.15
Grip, then Hotspot On	WCDMA 5	23.69	23.63	21.68
Grip, then Hotspot On	WCDMA 2	23.67	19.15	19.13

1.2. Procedures for determining proximity sensor triggering distances

(KDB 616217 D04v01r02 §6.2)

1. The distance verification procedure was performed according to the following procedure:
2. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
3. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 .Each applicable test position was evaluated. The distance were conformed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
4. Step 1 and 2 were repeated for the relevant modes, as appropriate
5. Steps1 through 3 were repeated for all distance-based power reduction mechanisms.

For detailed measurement conducted power results, please refer to the Section .9



Proximity Sensor Trigger Distance Assessment KDB 616217 D04 §6.2 (Rear /Bottom)

LEGEND

→ Direction of DUT travel for determination of power reduction triggering point

→ Direction of DUT travel for determination of full power resumption triggering point

Tissue simulating liquid	Trigger distance - Rear		Trigger distance - Bottom	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
1900 MHz Muscle	10	12	2	5

Distance Measurement verification for Proximity sensor

Rear side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)									
	15	14	13	12	11	10	9	8	7	6
WCDMA 2	23.58	23.55	23.58	23.57	23.65	19.05	19.02	19.16	19.11	19.2

Rear side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	8	9	10	11	12	13	14	15	16	17
WCDMA 2	19.18	19.08	19.09	19.06	19.16	23.52	23.55	23.69	23.7	23.62

Based on the most conservative measured triggering distance of 10mm, additional Phablet SAR measurements were required at 19mm from rear side for the above modes

Bottom side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)							
	7	6	5	4	3	2	1	0
WCDMA 2	23.58	23.65	23.6	23.6	23.56	19.02	19.18	19.16

Bottom side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	0	1	2	3	4	5	6	7	8	9
WCDMA 2	19.18	19.18	19.18	19.05	19.19	23.55	23.63	23.57	23.55	23.69

Based on the most conservative measured triggering distance of 2mm, additional Phablet SAR measurements were required at 1mm from Bottom side for the above modes

1.3 Proximity Sensor Coverage for SAR measurements

(KDB 616217 D04v01r02 §6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

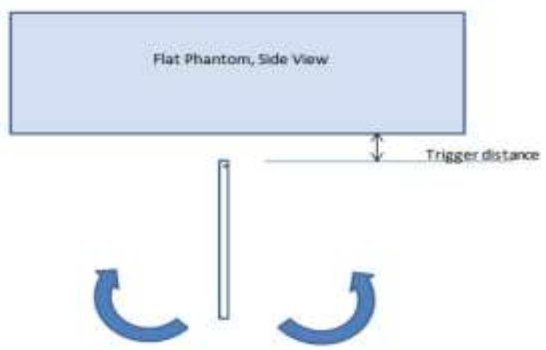
1.4 Proximity Sensor Tilt Angle Assessment

(KDB 616217 D04v01r02 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band.

The EUT was rotated about Bottom side for angles up to ±45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up ±45°.

Proximity s



Summary of Tablet Tilt Angle influe)

Band (MHz)	Minimum distance at which power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
1900 MHz Muscle	2 mm	On	On	On	On	On	On	On	On	On	On	On

1.5 Resulting test positions for Phablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Phablet SAR
WWAN (WCDMA B2)	Rear	10	N/A	N/A	9
	Bottom	2	N/A	N/A	1

Note: FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions

Per KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is > 160 mm and < 200 mm. When hotspot mode applies, extremity SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (with tolerance) is 1 g SAR > 1.2 W/kg